URBAN GREEN

U.S. GREEN BUILDING COUNCIL CHAPTER SM

Executive Summary
February 2010

NYC GREEN CODES TASK FORCE

A REPORT TO MAYOR MICHAEL R. BLOOMBERG & SPEAKER CHRISTINE C. QUINN

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THE CITY OF NEW YORK
OFFICE OF THE MAYOR
NEW YORK, NY 10007

July 8, 2008

Mr. Russell Unger
Executive Director
USGBC New York
Alexander Hamilton U.S. Custom House
One Bowling Green, Suite 419
New York, NY 10004

Dear Mr. Unger:

As you probably know, *PlaNYC*'s goals include cleaning up our waterways, providing cleaner, more reliable power, improving air quality, and ultimately reducing New York City's carbon footprint 30 percent by 2030, a goal that was recently codified in Local Law 22. According to the *Inventory of New York City's Greenhouse Gas Emissions 2007,* New York City's buildings account for almost 80 percent of our total greenhouse gas emissions. They also account for 95% of our electrical consumption, 85% of our water usage, and much the city's rainwater catchment area. Therefore, it is crucial that we ensure buildings in the city are constructed and renovated according to sustainable principles, including energy efficiency, and *PlaNYC* includes numerous tools that are allowing us to expand those activities.

The "greening" of the building and construction codes is an important part of this effort, and we have already made substantial progress. To begin moving to the next level, we are asking your organization to convene a group of building industry experts to undertake a review of the current building codes and make recommendations on how they could be amended to promote more sustainable practices. Ideally, this review will include:

1. Examining all codes including: Construction, Fire, Water and Sewer, and Zoning Resolutions
2. Recommendations on removing impediments to incorporating green technologies
3. Identifying opportunities to promote energy efficiency and other sustainable practices
4. Incorporating climate adaptation measures into the codes.

Greening our codes will be necessary if we are achieve our citywide goals for sustainability and greenhouse gas reductions, and we hope that you will partner with us in this effort. If you have any questions, please contact Rohit Aggarwala at 212-788-3069.

Sincerely,

Michael R. Bloomberg
Mayor

Christine C. Quinn
Speaker of the Council of the City of New York

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INTRODUCTION

City dwellers tend to think of the natural environment as something external to their lives, a fragile wilderness that needs to be protected through national efforts. But this way of thinking has begun to shift in recent decades. Climate change is now recognized as a universal threat, and dense cities have come to be understood as environmentally preferable to suburbs, despite seeming "unnatural." In this context, green building has emerged as a solution to many environmental challenges.

This is perhaps truer in New York City than elsewhere in the United States. While most U.S. cities focus their environmental policies around transportation, New York is already blessed with an excellent public transportation system. Consequently, 75 percent of greenhouse gas emissions and 85 percent of water use in New York are attributed to buildings.*

In 2007, New York City released PlaNYC, a comprehensive environmental agenda to guide sustainable growth. The plan calls for reductions in energy use, water use and other environmental impacts, culminating in a 30 percent reduction in greenhouse gas emissions by 2030. This goal was later codified into law under the Climate Protection Act (Local Law 55). But because buildings have such a preponderant impact on the environment, the goals of PlaNYC will be achievable only if the performance of the city's buildings is improved substantially.

Thanks in large part to the LEED rating system, the real estate industry now recognizes the enormous potential for improvement in the design, construction and operation of buildings. Virtually every stakeholder in real estate is now working to advance green building. For example, many members of the Real Estate Board of New York have become national leaders in developing green buildings, and the Building Owners and Managers Association has developed model green leases. Similarly, both the International Code Council (ICC) and ASHRAE are developing model green codes. Finally, several labor unions have developed green training programs and are working with Urban Green to develop additional training through GPRO, the Green Pro Building Skills program.

Even with this progress, green building remains the exception rather than the rule for the building industry. While many green building techniques and materials have spread throughout the industry, most buildings do not even come close to achieving their potential for efficiencies. Also, green building has been limited mainly to expensive, high-end buildings, depriving middle- and low-income New Yorkers of the benefits. Yet, it is the city's poorest residents who are least able to afford the high operating costs of inefficient buildings.

In July 2008, New York Mayor Michael Bloomberg and New York City Council Speaker Christine Quinn asked Urban Green Council to convene the NYC Green Codes Task Force. The charge to the Task Force was to recommend green changes to the laws and regulations affecting buildings in New York, bringing them to the "next level." But unlike several other cities, New York chose not to mandate LEED for private construction (LEED is already a requirement for public construction in New York). Rather, LEED is intended as a leadership standard (after all, the "L" in LEED stands for Leadership), not a baseline; New York City leaders want to raise the baseline to achieve large-scale change.

Greening the codes has significant advantages over mandating LEED for the private sector. Codes create economies of scale in both expertise and materials, thereby lowering costs. Codes are also enforceable,

and they build on existing institutions and industry practices. They can be tuned to the priorities and conditions of a particular jurisdiction. In addition, codes allow the city to correct market failures, such as split incentives; these include landlords who do not want to pay for improvements because the benefits would go to their tenants. Finally, codes help the City achieve social equity and environmental justice. By modifying codes and driving down costs, green buildings can be available to all.

Fortunately, New York has the expertise to undertake this task, given its world class architecture and engineering community, and its proud history of green building. By the late 1980s, many pioneers of the green building movement were practicing in New York, redefining environmentalism as an urban phenomenon. And during the 1990s, the City's Department of Design & Construction, the Battery Park City Authority, and the Durst Organization began experimenting with green building. In the last decade, many of New York's other real estate leaders have become green building leaders. As a result, New York today enjoys an enormous concentration of green building experts, both among its city officials and among its design, construction and real estate firms.

While the 111 recommendations of the NYC Green Codes Task Force are tailored to New York City, many will be applicable to other jurisdictions, particularly those that use the ICC family of construction codes or ASHRAE for energy. The Task Force's 200+ volunteers have produced a work of great specificity and depth. Each proposal includes statutory language, a detailed explanation of the issues, an analysis of costs and savings, precedents from other jurisdictions, a comparison of the proposal to any related LEED credits, and information on implementation.

The recommendations of the Task Force primarily affect new buildings under construction and existing buildings that are being renovated. But in a few cases, the Task Force also recommends targeting upgrades to existing buildings to correct some widespread problems.

One fundamental principle underlies the work of the Task Force, namely, that environmental issues and climate change should explicitly join the protection of health and safety as the purpose of the codes. Environmental issues have serious, long-term impacts on public health and safety, including the very habitability of New York City, the region, and even the planet. For this reason, the Task Force's first recommendation is that the purpose section of New York's construction codes be modified to include the words "environmental protection." This principle sets the stage for the many recommendations in this report, as well as for future efforts to "green" the codes.

Urban Green would like to thank the hundreds of volunteers who dedicated countless hours of their time to produce this report. Their intelligence, insight, and generosity resulted in a document of depth and breadth. We also thank New York City Mayor Bloomberg and Council Speaker Quinn for entrusting us with the honor of leading this task force, and for their extraordinary leadership.

CREATING THIS REPORT

The New York City Green Codes Task Force report is the product of an army of dedicated volunteers, leaders in the design and construction industries, who have collectively devoted hundreds of hours to developing, critiquing, and refining these proposals. These volunteers include architects; engineers; lighting, landscape architects and interior designers; owners and developers; corporate tenants; contractors; cost estimators; affordable-housing experts; code specialists; attorneys; waste haulers; scientists and public-health experts; and representatives of environmental organizations, building trade unions, city agencies, and industry and professional associations. The work of this diverse group was directed and organized by Urban Green Council staff, with advice and support from the Mayor's Office of Long-Term Planning and Sustainability and the Office of City Council Speaker Christine Quinn.

ASSEMBLING THE TASK FORCE

On July 8, 2008, New York Mayor Michael Bloomberg and City Council Speaker Christine Quinn asked Urban Green to assemble the NYC Green Codes Task Force and direct their efforts. Urban Green and the Mayor's Office worked together to structure the Task Force and assemble its membership. The structure would require both technical input and oversight. Nine Technical Committees, composed largely of design professionals, would generate most of the ideas. Oversight would be provided by two committees: a Steering Committee, drawn from the technical committees, Urban Green and relevant municipal officials, to oversee the process; and an Industry Advisory Committee of stakeholders to provide essential feedback on the proposals. The precise roles and composition of these committees are:

- Steering Committee: As the ultimate decision-making body for the Task Force, its purpose was to ensure that the Task Force achieved the goals put forward by the Mayor and the Speaker. Its members were the chairs of the eight Technical Committees and representatives from Urban Green, the Mayor's Office, the Speaker's Office, and key NYC agencies.
- Industry Advisory Committee: This group of industry stakeholders was assembled to provide feedback on the feasibility and coherence of the proposals. Its members included developers, building owners, contractors, unions, environmentalists, universities, affordable housing experts, commercial tenants, and representatives from professional and industry organizations.
- Technical Committees: The structure of these committees was based on the LEED subject areas, modified to reflect areas of technical expertise and include emerging areas of interest in New York City. There were eight original committees and one ad hoc committee: Climate Adaptation, Construction Practices, Energy & Ventilation, Homes, Lighting & Day Lighting, Materials & VOCs, Physical Activity (ad hoc), Site & Site Stormwater, and Water Efficiency & Building Stormwater. Most of the committee members were building design professionals, including architects and landscape architects, engineers, lighting and interior designers, and experts in construction, along with representatives from relevant city agencies.

BRAINSTORMING, CONCEPTUAL REFINEMENT & CODE DRAFTING

The work of the Task Force began on July 14, 2008, with a kick-off meeting for all members.

This was followed by three months of almost daily meetings – roughly 70 in all – by the Technical Committees. During the first cycle of meetings, the Technical Committees brainstormed ideas on both code impediments that should be removed and code enhancements that should be added to NYC's laws and regulations. They also considered code proposals from other cities, states, and countries; innovative and groundbreaking ideas that have not been implemented elsewhere; and issues that are specific to New York City's buildings. Next, the Technical Committees reconvened for a second cycle of meetings, during which they first selected and prioritized these ideas, then developed

the first draft of their proposals, including preliminary code language. These drafts were then reviewed by the oversight committees and relevant city agencies.

In an iterative, 10-month effort, the proposals were edited, packaged and critiqued, then edited once again. At each step, Urban Green managed the process, mediated among stakeholders, and fleshed out and refined much of the content, including code language and supporting information. The Task Force issued four formal drafts of all the proposals, followed by reviews and comments by the oversight committees and relevant agencies. In between, there were numerous drafts of individual proposals, with separate meetings, sometimes including multiple agencies and outside experts, devoted to refining them.

At the request of the Industry Advisory Committee, the first cost of each proposal was analyzed, along with the length of payback for many proposals. This cost analysis was performed pro-bono by Bovis Lend-Lease with direction from the Mayor's Office of Economic Development. The New York offices of Fried, Frank, Harris, Shriver & Jacobson LLP also provided pro-bono review of legal language within the recommendations.

FINAL COST ANALYSIS, REPACKAGING & STATEMENT OF SUPPORT

Substantive revisions to proposals were closed in August 2009 for a pre-publication review by the Mayor's Office & Speaker's Office and to prepare the final report for release. With proposals no longer being revised, the costing exercise could advance. Bovis Lend Lease prepared draft cost assessments, and these were reviewed by the Technical Committee chairs and members of the Industry Advisory Committee. Drawing on the costing approach developed by the Department of Building for the 2006 code revision, the final cost analysis included estimates for various building types. A detailed explanation of the costing exercise is provided in the *Financial Cost & Savings Methodology* section of this report.

The proposals were originally grouped according to the subject matters represented by each Technical Committee. As the project neared completion, major themes emerged that crossed committee boundaries. For example, several committees developed proposals that addressed both health issues and passive design. To reflect these new underlying themes, the proposals were regrouped into new categories.

Finally, the Industry Advisory Committee reviewed the fourth draft of proposals and endorsed the following statement:

> This report proposes a wide range of recommendations to address local and national concerns of energy independence, human health, and environmental sustainability, including climate change. The Industry Advisory Committee supports some proposals of the NYC Green Codes Task Force, while noting that many proposals require further refinement and others have uneven support among Committee members. The Committee will work with the Mayor's Office and City Council to refine the proposals in the coming months.

FINAL REPORT

The complete report of the New York City Green Codes Task Force was delivered to New York Mayor Michael Bloomberg and City Council Speaker Christine Quinn on February 1, 2010, the result of 18 months of intense analysis and industry collaboration. In the opinion of the Steering Committee, many proposals in this report are ready for implementation, while many others require further review and revision. Urban Green and the rest of the Task Force look forward to working with the Mayor and Speaker to implement and refine this work.

READING THIS REPORT

The more than 100 proposals of the Task Force Report have been divided into ten categories, and are numbered within each. The *Proposal Summaries* include short descriptions of the "Issue" the proposal is intended to address, a succinct description of the "Recommendation" of the Task Force and a simple graphic representation of the anticipated impacts of each proposal on the environment, health, savings and cost.

The *Full Proposals* section of the document includes the full text and documentation of each proposal, including expansive supporting information, and where appropriate the exact code or legal language the Task Force recommends govern the issue at hand. Also included is an expanded description of the issue the proposal addresses, as well as descriptions of: environmental and health benefits of the proposals, background to the cost & savings analysis, similar precedents, the impact of the proposal on LEED certification, and implementation and market availability issues related to the proposal.

Appendix A is the draft cost and savings analysis of each proposal.

Both the full report and the Executive Summary are available in PDF format here:

www.urbangreencouncil.org/GreenCodes

KEY TO THE IMPACT GRAPHICS

The proposals have been analyzed with respect to their projected impacts on four categories: the environment, human health, operational savings, and the cost of construction. The first three categories represent benefits and are grouped together on the left, with the costs required to obtain those benefits located on the right. The projected impacts are presented using the symbols below. In general, a dash means there is negligible impact in a category, while N/A means that that the impact was not able to be assessed or the category is not applicable to the proposal.

ENVIRONMENT

- An indirect positive impact on the environment.
- A low positive environmental impact per building and impacts a low number of buildings.
- Either a) a low positive environmental impact per building and impacts a large number of buildings, or b) a high positive environmental impact per building and impacts a low number of buildings.
- A high positive environmental impact per building and impacts a large number of buildings.

HEALTH

- An indirect positive impact on public health.
- A low positive public health impact per building and impacts a low number of buildings.
- Either a) a low positive public health impact per building and impacts a large number of buildings, or b) a high positive public health impact per building and impacts a low number of buildings.
- A high positive public health impact per building and impacts a high number of buildings.

COSTS & SAVINGS

See the *Financial Cost & Savings Methodology* section for a detailed overview of how costs and savings were determined. The cost analysis estimates the increase in first cost of construction relative to standard construction costs across a range of building types. Since the cost impacts often varied according to building types or by design strategy selected, and since some proposals would actually decrease costs, it was necessary to show both positive and negative impacts and also the range of anticipated impact within this category.

In some cases, the estimated cost of a proposal differed between building types. Where there is a range in estimates, cost increases found only in some building types are represented with open dots.

For example:

● ○ ○ means the minimum estimated cost increase was 0.01% and one or more building types had cost increases greater than 0.5%. Refer to the draft cost analysis in Appendix A for more specific information about each proposal.

Operational savings were only estimated for proposals dealing with Energy, Lighting or Water.

COSTS

- Proposal reduces the initial cost of construction.
- Proposal increases initial cost by less than 0.01%.
- Proposal increases initial cost between 0.01% and 0.05%.
- Proposal increases initial cost between 0.05% and 0.5%.
- Proposal increases initial cost more than 0.5%.

SAVINGS

- This proposal does not result in operational savings.
- Operational savings have an estimated financial payback period greater than ten years but less than the expected life of the equipment or structure.
- Operational savings have an estimated financial payback period of three to ten years.
- Operational savings have an estimated financial payback period of less than three years.

PROPOSAL SUMMARIES

OVERARCHING CODE ISSUES

Most change is incremental, but there are times when disciplines go through periods of sweeping change. The green building movement, along with growing awareness of climate change, has catapulted building design and operation into such a period. For example, the U.S. Congress' draft energy bill would direct energy codes to increase the efficiency of new buildings by 75% over the next 20 years, in stark contrast to the slow and uneven pace of energy code improvements over the past 30 years.

Accommodating this dramatic shift in the building industry will require considerable capacity-building in both government and the private sector. Every Technical Committee emphasized the need for training in the codes and for code enforcement. After all, codes are not worth the paper they're printed on unless enforced; similarly, the building community needs information and training to comply with new requirements.

Also, rapid improvements in green building strategies and technologies mean that New York City's government will need to develop processes that accommodate and facilitate these changes. The city will need to be more nimble in both approving new technologies and permitting advanced projects that cross traditional jurisdictional boundaries.1 The city will also need to keep its codes up to date by regularly reconvening a green codes process that engages knowledgeable practitioners.

Finally, the purview of the codes should be expanded to reflect and accommodate the shift toward sustainable building practices. Chief among these expansions is the need to clarify the mandate of building codes to protect the environment. This should be seen as a natural extension of the concept of protecting health and safety. The green code provisions should also apply to all buildings, not just those completed after July 2009. Further, the design and construction of the landscape needs to be housed in a unified section of the code so that it can be addressed comprehensively. This has been a lacuna of the codes that nonetheless impacts multiple issues, including stormwater runoff, materials consumption, the urban heat island effect, and biodiversity.

OC 3: **85% of the buildings we will occupy in 2030 exist today. If any significant portion of these existing buildings are exempted from modern code standards we will make little progress in making NYC an environmentally responsible and healthy place to live and work.**

Anticipating Future Risk.

Significant reforms to our building codes have historically been in response to disasters like the Triangle Factory Fire of 1911 or the 2003 blackout. But a retroactive approach to the global climate change crisis is inadequate because once repercussions like sea level rise are underway they will be effectively irreversible. And changes are coming. The New York City Climate Change Adaptation Task Force predicts that by 2030 sea level rise in New York will reach 7-12 inches, average daily temperatures will be 3-5 deg. F hotter, precipitation will be 10% greater and there will be more frequent extreme weather events.

OC 1

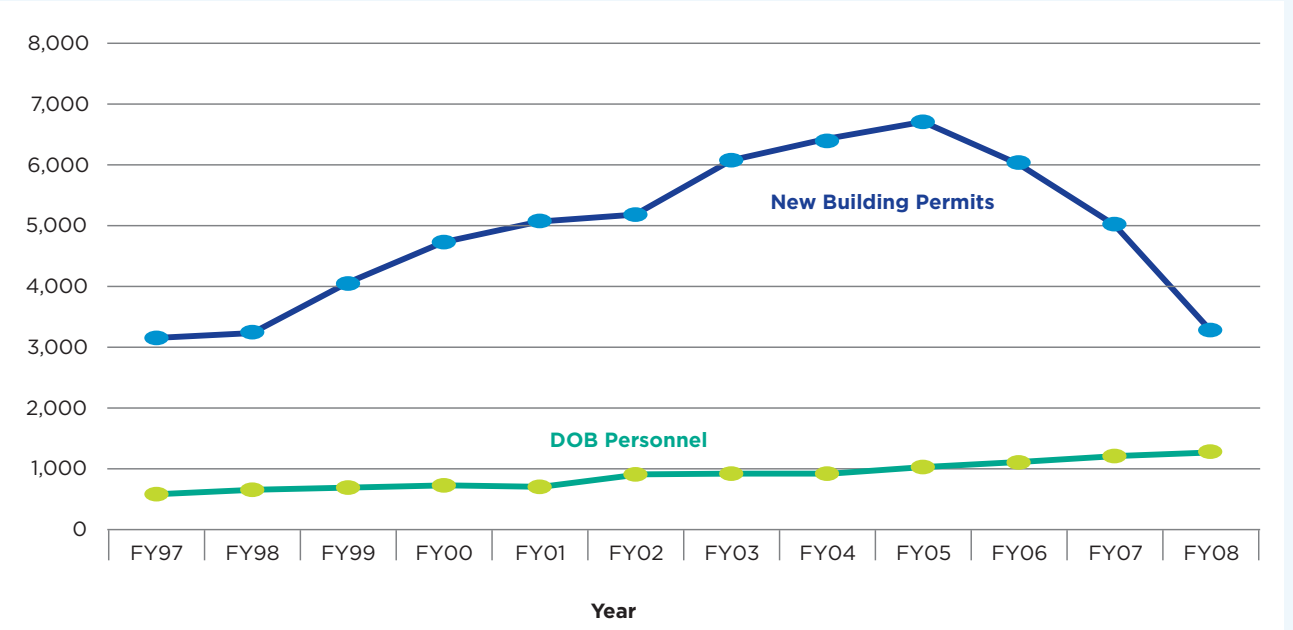
Add Environmental Protection as Fundamental Principle of the Construction Codes

Issue:
Although environmental protection is not expressly recognized as a principle informing the building code, environmental risks are more likely to affect New York City buildings and their residents than many other risks currently addressed in the code.

Recommendation:
Amend the intent section of the building code to include environmental protection as a fundamental principle.

Benefits		**Costs**
N/A	Savings	Cost
	Health & Safety	
	Environment	

OC 2: **BUILDING PERMITS ISSUED 1989-2008**



OC 2

Fully Enforce NYC's Construction Codes

Issue:
Codes are increasingly viewed as an essential, low-cost strategy for achieving energy and carbon reduction targets. However, to be effective, codes must be enforced.

Recommendation:
Develop a strategy to achieve 90% code compliance citywide, and address known impediments to enforcement.

Benefits	Costs
N/A	N/A

OC 3

Don't Exempt Existing Buildings from Green Codes

Issue:
Buildings constructed before the 2007 building code went into effect can use the laxer standards of the 1968 code for alterations. This exception allows existing buildings to bypass the environmental and health enhancements recommended by the NYC Green Codes Task Force.

Recommendation:
Require all buildings to comply with improved environmental and health standards.

Benefits		Costs
N/A	Savings	Cost
	Health & Safety	
	Environment	

OC 7: **Further education will be necessary for architects and engineers to keep up with changes to our construction laws.**

OC 4

Reconvene The Green Codes Task Force

Issue:
Green building is a rapidly evolving field, and New York City's construction laws need to keep pace with these changes.

Recommendation:
Reconvene the NYC Green Codes Task Force every three years.

Benefits	Costs
N/A	N/A

OC 5

Consolidate Regulation of Landscape Practices

Issue:
Landscape and site design have an impact on important urban environmental issues, such as the urban heat island effect, stormwater capture and run-off, species diversity, maintenance, toxicity, and materials flows. However, New York City does not have a code or ordinance to address these issues comprehensively.

Recommendation:
Add a chapter on landscape and site to the city's Building Code.

Benefits	Costs
N/A Savings	Cost
Health & Safety	
Environment	

OC 6

Streamline Approvals for Green Technologies & Projects

Issue:
New products and technologies that address environmental concerns are rapidly being developed, and many building owners and developers are eager to implement them. However, there are often no rules governing the use of new products. There are also interagency regulatory issues, which can prohibit or delay projects that utilize new technologies.

Recommendation:
To facilitate the use of innovative technology that can have significant environmental benefits, the city will establish an Interagency Green Team to assist innovative projects in overcoming interagency regulatory hurdles. It will also establish an Innovation Review Board to evaluate technologies for pilot projects or recommend that rules be established for their use. Independent of the Task Force proposal, the New York City Department of Buildings has initiated a Building Sustainability Board to streamline approvals of new green technology.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

OC 7

Enhance Code Training for Architects & Engineers

Issue:
With the adoption of the 2008 New York City Construction Codes, along with regular revisions and the addition of new green provisions, the city's building codes are continuously changing. It is important that the city informs building professionals of all code changes and ensures that training is provided so that practitioners can comply with new requirements.

Recommendation:
Develop a strategy to ensure that building professionals are aware of code changes and able to access training on the most current versions of the New York City Construction Codes. The Mayor's Office began working with industry associations, including Urban Green, AIA New York, and ASHRAE New York, to develop training prior to issuance of this report.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

HEALTH & TOXICITY

In the mid- to late-19th Century, most of New York City's residents were crowded into a lower Manhattan that rivaled the density of Calcutta. Many lived in unsanitary tenements with little access to either light or fresh air. Tuberculosis was rampant, and epidemics of scarlet fever, cholera and other diseases were all too frequent. Gradually, scientists demonstrated that many of these diseases were spread by infested water, airborne germs, insects, and even overcrowding – mechanisms that were "environmental" insofar as they were part of the surroundings. In response, New York set about making its environment healthier with new building codes and zoning requirements, the development of parks, and the creation of better sanitation systems.

These new codes and improved infrastructures, combined with public immunization programs, worked so well that the average life expectancy among New Yorkers nearly doubled between 1900 and 2000.1 Similarly, the percentage of deaths attributed to communicable diseases fell from 57% of all New York City deaths in 1880 to just 9% in 2005.2 Now, most New York City deaths result from chronic diseases, not communicable ones.

The environment still continues to play a major role in spreading chronic diseases. Poor air quality inside buildings and smog outside can trigger asthma attacks, which now afflict an estimated 1 million New Yorkers. Also, many chemicals used in building supplies and furnishings are toxic; some have been implicated as causing cancers, endocrine disorders, and other serious diseases. Even obesity, a precursor to many diseases, can be attributed to the ways in which our buildings and infrastructures discourage walking and other forms of physical exercise.

The code proposals in this chapter aim to reduce the incidence of chronic diseases by making New York a healthier place in which to live. They concentrate on buildings because, in such a dense city, buildings essentially are the environment – they're where we spend roughly 90

percent of our time. In fact, indoor air quality has a greater impact on the health of New Yorkers than does outdoor air. Even most of our exercise is taken indoors.

The recommendations in this section aim to reduce the levels of indoor pollutants, which can be up to 1,000 times higher than outdoor levels. They would do so by limiting harmful compounds used in many building materials and reducing other unhealthy contaminants from entering the building via foot traffic and ventilation systems. The proposals also aim to increase ventilation levels in residences and improve air quality both during and after construction activities. They would further reduce toxic compounds found in existing light fixtures. And by phasing out dirty boiler fuels, they would improve both indoor and outdoor air quality. Of course, the proposals in the *Energy & Carbon Emissions* chapters of this report also aim to improve air quality by reducing the use of fossil fuels.

Several of the proposals stake out new territory by addressing the environmental causes of the obesity epidemic, which affects many New Yorkers and is known to increase the incidence of diabetes and related diseases. In 2008, 56 % of the city's adults3 and 39% of the city's elementary school students4 were either obese or overweight. What's more, the increased incidence of obesity is not unrelated to rising energy use and global warming. In fact, human energy has largely been replaced by petrochemical energy. We move about in cars and trains rather than walking or bicycling; we watch televisions and computers rather than play outdoors; and we ride elevators and escalators instead of climbing the stairs. Several proposals in this section would help reverse this trend by making stair use in buildings more accessible and more appealing. A final proposal, aimed at increasing access to water fountains, seeks to reduce the excess intake of calories by making it easier to drink water than sugary soft drinks.

HT 1

Limit Harmful Emissions From Carpets

Issue:
Carpet, carpet backing, carpet cushion and adhesives emit respiratory irritants and cancer causing compounds, which are harmful to the comfort and well-being of installers and occupants.

Recommendation:
Establish standards, in accordance with national industry programs, to limit the presence of volatile organic compounds in carpet, carpet backing and carpet adhesives.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

That New Car Smell.

Volatile organic compounds (VOCs) are common chemical contaminants that easily evaporate into the air at room temperature and are often noticed as the familiar odor of paint or "new car smell." VOCs are present in a vast array of building materials, from paints and sealants and glues, to composite products like fiberboard. Some are known carcinogens that contribute to "sick building syndrome" and have been linked to luekemia. They can cause eye, nose and throat irritation; headaches, fatigue, loss of coordination, and nausea; and can damage the liver, kidneys and the nervous system. EPA studies have found levels of VOCs inside homes can be 2 to 5 times higher than outside, with some indoor levels over 1,000 time higher following activities like paint stripping. VOCs contribute to ground level ozone formation (smog), which can cause respiratory problems and exacerbates asthma, emphysema, and bronchitis. In addtion to human health impacts, VOCs effect local ecosystems, damaging or weakening trees and plants, and reducing forest growth and crop yield.

HT 2

Limit Harmful Emissions From Paints & Glues

Issue:
Volatile organic compounds (VOCs) are emitted from building materials, glues, adhesives, paints and lacquers. These compounds are respiratory irritants that adversely affect the health of workers and occupants.

Recommendation:
Reduce indoor air contaminants by limiting VOCs in adhesives, sealants, paints and coatings.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

HT 3

Restrict Cancer-Causing Formaldehyde In Building Materials

Issue:
Formaldehyde is a carcinogen and irritant found in composite wood materials, which are widely used in construction.

Recommendation:
Limit the content of formaldehyde in non-structural composite wood products.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

HT 5

Filter Soot from Incoming Air

Issue:
HVAC systems bring outside air into buildings, along with airborne pollutants. Without proper filters, this can lower the quality of indoor air.

Recommendation:
Require the use of HVAC systems that filter soot and other pollutants from indoor air.

Benefits

Savings

Health & Safety

Environment

Costs

Cost

HT 4

Keep Street Contaminants Out of Buildings

Issue:
Foot traffic brings many indoor air contaminants and bacteria into buildings. These particulates irritate the respiratory system and can trigger asthma.

Recommendation:
Require new buildings to install permanent entry mat systems to capture particulates.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

HT 6

Ensure Ventilation Airflow in Residences

Issue:
The new requirements for ventilation in the Building Code save a great deal of energy. However, if the systems are not adjusted properly, the energy savings will come at the expense of indoor air quality.

Recommendation:
In new construction, require improved design parameters, testing, and balancing for exhaust ventilation systems.

Benefits

Savings

Health & Safety

Environment

Costs

Cost

HT 7

Reduce Mold in Bathrooms

Issue:
Mold is common in moist areas of many buildings, such as showers. Exposure to mold can cause negative health effects, including allergic responses, asthma and other respiratory irritations.

Recommendation:
Require the use of mold-resistant gypsum board and cement board in water-sensitive locations.

Benefits

N/A Savings

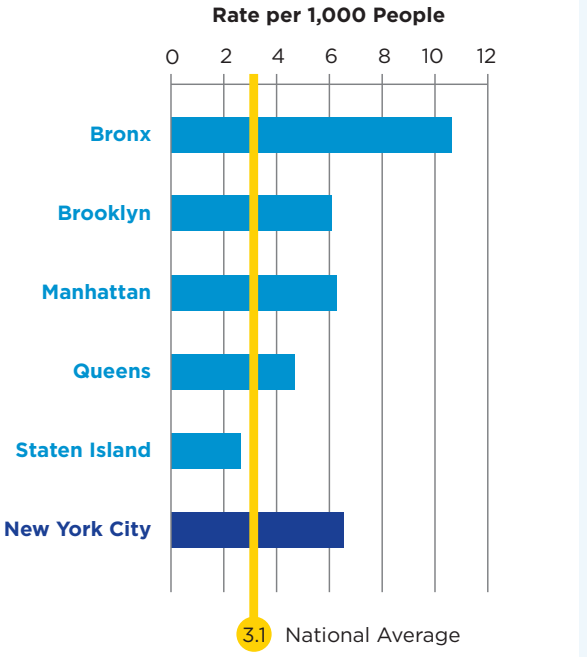
Health & Safety

Environment

Costs

Cost

HT 7: **ASTHMA HOSPITALIZATIONS**
Children age 0 to 12 years, 2004



HT 8

Improve Air Quality During & After Construction

Issue:
Construction activities can lead to the release of substances, such as volatile organic compounds (VOCs) and particulates, that have an adverse effect on the health of construction workers and occupants alike.

Recommendation:
Provide ventilation during construction, protect the HVAC system from contaminants and absorptive materials from moisture, and flush out bad air before occupancy.

Benefits

Savings

Health & Safety

Environment

Costs

Cost

HT 9

Phase Out Dirty Boiler Fuels

Issue:
Boilers that use #4 and #6 fuel oils emit a substantial portion of the city's air pollution.

Recommendation:
Do not issue new permits for boilers using #4 and #6 fuel oils, and require all new burners to utilize only #2 fuel oil and/or gas fuel. The issue addressed by this proposal is already under consideration by the City.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

Twice The Lighting?

NYC codes mandate emergency lighting levels roughly twice that of the rest of the country. Reducing these lighting levels will not only save energy, but will also reduce the size and disposal frequency of the batteries typically used for these systems. These batteries contain extremely toxic materials like lead and cadmium and are often disposed of as regular trash.

HT 10

Phase Out Toxic & Inefficient Light Fixture Components

Issue:
The EPA banned the manufacture of polychlorinated biphenyls (PCBs) in 1978, but old and inefficient ballasts containing PCBs are still in use today. PCBs are chemicals that bioaccumulate in the environment, threaten the reproduction of many species of plants and animals, and are linked to certain cancers.

Recommendation:
Institute a mandatory phased removal of all existing PCB and magnetic ballasts, starting with the largest buildings by 2013 and working down to all buildings by 2019.

Benefits	Costs
Savings	Cost
Health & Safety	
Environment	

HT 11

Convene Task Force on Recycling Fluorescent Light Bulbs

Issue:
Despite increased use of fluorescent lamps and ballasts, there is a lack of public information about these lights and limited options for their safe disposal.

Recommendation:
The Department of Sanitation should convene a task force to study and determine the best bulb recycling program for NYC.

Benefits	Costs
N/A Savings	N/A
Health & Safety	
Environment	

HT 12

Reduce Oversized Batteries in Emergency Lighting

Issue:
Much emergency lighting is powered by batteries, which contain heavy metals and other hazardous substances. By mandating twice as much emergency illumination as the rest of the country, the NYC building code promotes excessively large battery systems.

Recommendation:
Reduce the required level of emergency lighting, thereby reducing battery size.

Benefits	Costs
N/A Savings	Cost
Health & Safety	
Environment	

HT 13

Treat Corrosive Concrete Wastewater

Issue:
Concrete trucks, buckets and washout pump trucks are typically rinsed at construction sites, and the runoff is then directed to a stormwater drain. This water is corrosive and should not be discharged onto public streets or into rivers.

Recommendation:
Require wastewater from concrete mixer trucks to be either treated on site or returned to the manufacturing plant for treatment.

Benefits	Costs
N/A Savings	Cost
Health & Safety	
Environment	

HT 14

Reduce "Red Tape" for Asbestos Removal

Issue:
Products containing encased asbestos, such as vinyl tile or window putty, can be safely removed using simpler procedures than those required for the removal of crumbly asbestos products. While New York State allows the use of such simplified procedures, the New York City Department of Environmental Protection (NYCDEP) requires contractors to obtain a variance in order to do so.

Recommendation:
NYCDEP should allow projects removing encased asbestos products to utilize approved, simpler procedures without a variance. This proposal was incorporated into DEP Rules prior to the issuance of this report.

Benefits	Costs
N/A Savings	Cost
Health & Safety	
Environment	

HT 13: **Concrete washout water has a pH comparable to Drano® Clog Remover.**

Cleaning Up Concrete.

When concrete trucks are washed out in NYC, construction firms are permitted to dispose of the water directly to the ground, the street or the City sewer- which commonly outflows to local rivers. Because concrete often contains portland cement, antifreeze, fly ash and slag, the washout water has a pH above 12, comparable to Drano Clog Removers. Concrete washout water also contains toxic metals like arsenic, chromium, lead and zinc. Direct contact or ingestion of this washout water is harmful to humans and, undiluted, is lethal to aquatic life. For a 1.2 million square foot project, proposal HT 13 would prevent the release of 163,500 gallons of untreated concrete washout water to neighboring streets and the City sewer- the amount of water in a four lane wide and four foot deep, Olympic length (50 meter) swimming pool.

HT 15

Allow Stairway Use

Issue:
Locked doors inhibit the use of stairs, deterring physical activity and fitness.

Recommendation:
Encourage regular physical activity in buildings by requiring stair doors to be unlocked, while allowing exceptions for security access devices.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

HT 16

Encourage Stairway Use with Transparent Doors

Issue:
Opaque doors discourage stair use by making them difficult to locate, uninviting and less safe.

Recommendation:
Require doors to public access stairs to include glass.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

HT 17

Promote Stair Use Through Signage

Issue:
People are insufficiently aware of the health benefits of using stairs.

Recommendation:
Encourage stair use by requiring signs that prompt stair use and that provide floor re-entry information.

Benefits

N/A Savings

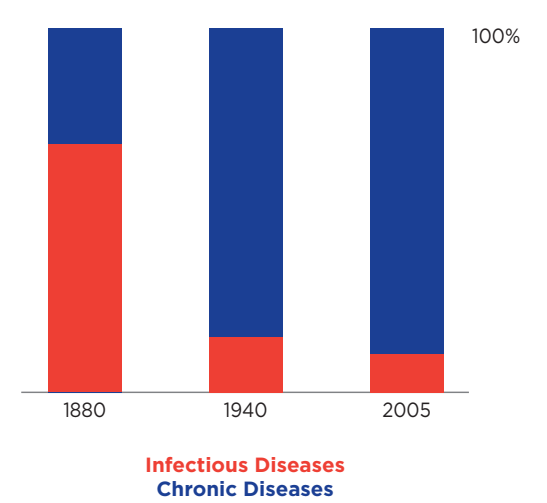
Health & Safety

Environment

Costs

Cost

HT 15: **CAUSES OF DEATH IN NYC**



HT 19: **People are more likely to use stairs instead of elevators if they are inviting and conveniently located.**

HT 18

Encourage Stairway Use by Holding Doors Open

Issue:
One means of encouraging stair use is to hold doors open by magnets that release the doors when smoke is detected. But the building code does not permit the use of these magnetic devices for stair doors.

Recommendation:
Allow the use of magnetic devices to hold doors open for stairs of three stories or less.

Benefits	Costs
N/A Savings	Cost
Health & Safety	
Environment	

HT 19

Provide Zoning Bonus for Inviting Staircases

Issue:
When stairs are easy to locate, convenient, and attractive they are well used. But in most new buildings, stairs are built as hidden necessities.

Recommendation:
Reward buildings with a zoning bonus for designing stairs that are prominent and accessible.

Benefits	Costs
N/A Savings	Cost
Health & Safety	
Environment	

HT 20

Increase Availability of Drinking Fountains

Issue:
People buy and consume bottled water and sugary drinks, in large part, because there are not enough easily accessible water fountains. All bottled drinks stress the environment by wasting materials, using energy for transportation, and creating waste. Also, sugary drinks can contribute to chronic diseases.

Recommendation:
Increase the number of required drinking fountains, and also require that they include faucets for filling bottles. Do not allow bottled water to substitute for fountains.

Benefits	Costs
Savings	Cost
Health & Safety	
Environment	

HT 20: **Accessible water fountains will reduce reliance on bottled water and sugary drinks.**

ENERGY & CARBON EMISSIONS

FUNDAMENTALS

Reducing both energy use and the carbon emissions that cause global warming constitutes our most urgent global priority. The International Panel on Climate Change (IPCC) has concluded that to stabilize the world's climate near a 2° C increase over preindustrial temperatures, industrialized nations must reduce their emissions by at least 80 percent by 2050. If this can be achieved, we should avoid the most disastrous impacts of ice melts and rising sea levels. At the local level, New York City has committed to the first wave of reductions by passing Local Law 55 of 2007, which requires the city to reduce its greenhouse gas emissions by 30 percent by 2030.

Achieving these dramatic reductions will be complicated due to the city's pervasive use of energy. Large-scale, systematic changes will be involved, including the roughly 1 million buildings in New York City alone, each with numerous energy systems and sub-systems. Due to this high degree of complexity, a large number of proposals are required: In all, roughly half of the 111 code proposals in this report aim at reducing carbon emissions, and more reductions will ultimately be needed to reach the IPCC's target.

For this reason, the *Energy & Carbon Emissions* proposals have been divided into three sections. The first, *Fundamentals*, lays the groundwork by clarifying the underlying codes and ensuring that buildings require smaller energy systems. The second, *Energy Efficiency*, sets requirements to make those energy systems more efficient. And the third, *Operations & Maintenance*, seeks to ensure that these energy systems are run properly. Together, these proposals aim to do more than merely save energy and reduce carbon emissions. They would also save New Yorkers money by reducing energy costs, improve public health by improving air quality, and make the city's building stock more resilient.

The *Fundamentals* chapter includes several proposals that would clarify and advance New York City's underlying energy codes. One proposal would require designers of commercial buildings to use the latest version of ASHRAE 90.1 (the energy standard developed and updated by the American Society of Heating, Refrigeration, and Air Conditioning Engineers) rather than allowing a version of both ASHRAE and another base code, both outdated, with over a dozen sub-paths, as is now the case. As a result, most other proposals in the three *Energy & Carbon*

Emissions chapters are drafted as amendments to the 2007 version of ASHRAE 90.1. Another proposal would reduce gaming by requiring projects that use energy modeling to achieve higher standards. Still another proposal would require that new residential projects be built in compliance with U.S. Energy Star requirements.

A second group of *Fundamentals* proposals would reduce the need for energy by promoting passive design strategies, which, because they are built into the building fabric, tend to be more durable than efficiency improvements. For example, envelopes would need to be thoroughly airtight and achieve a minimal level of insulation, with incentives to encourage exemplary performance. Barriers to external insulation and shading devices would be removed, and natural ventilation would be facilitated. Other requirements would reduce cooling loads through lighter surfaces on roofs and pavements, and similarly reduce lighting loads through the use of daylight harvesting.

A final group of proposals would remove barriers to distributed energy production and renewable energy. One would clarify language to allow the use of bio-fuels. The remainder of the proposals would make it easier to site alternative energy equipment by updating the language in the Landmarks Preservation Commission rules, the Zoning Resolution, and the Construction Codes.

EF 1

Simplify Commercial Energy Code to Current ASHRAE 90.1

Issue:
The Energy Code provides commercial buildings two major compliance paths with over a dozen subpaths. This results in an excessively complex code structure, which creates loopholes and makes enforcement difficult.

Recommendation:
To simplify compliance and enforcement, require that all commercial buildings follow ASHRAE 90.1.

Benefits

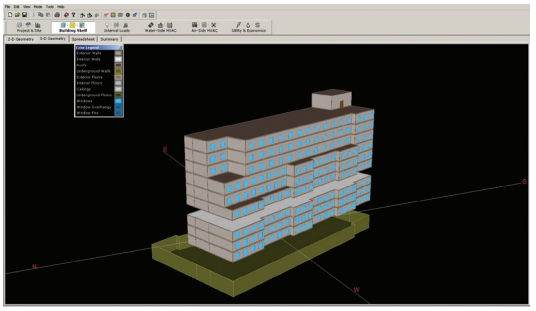
N/A Savings

Health & Safety

Environment

Costs

Cost



EF 1: **Computer generated energy models plays large role in energy code compliance.**

We Have Two Energy Codes?

Yes. For a variety of historical reasons New York State currently allows commercial buildings to comply with either of two separate but equally exhaustive and complex energy codes, known as ASHRAE 90.1 and ICC Chapter 8. This situation greatly complicates the entire design and code review process; from a designer determining baseline requirements to a code official analyzing compliance.

EF 2

Build New Homes to Energy Star® Standard

Issue:
New homes are not designed to take advantage of cost-effective energy-saving measures. Energy Star is a widely accepted national standard for energy-efficient housing design.

Recommendation:
Require all new residential buildings of three stories or less to be constructed to ENERGY STAR standards.

Benefits

N/A Savings

Health & Safety

Environment

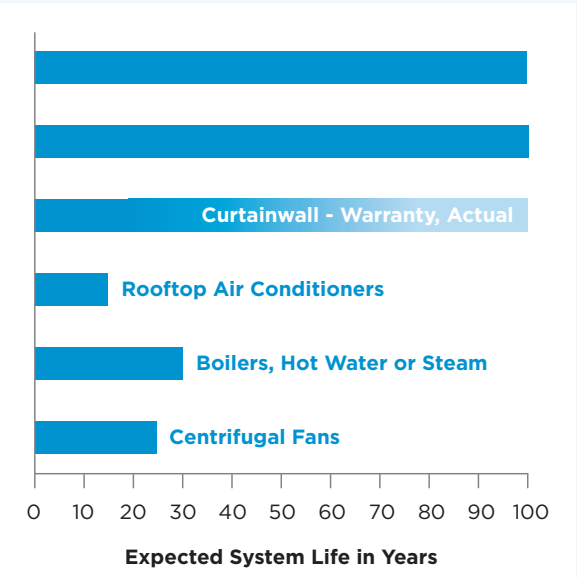
Costs

Cost

A System Of Trade-offs.

Currently the energy code allows a project to trade greater efficiency in one system against lower efficiency in another. For instance, the energy efficiency gained by choosing better lighting can be traded against a low performance building façade with minimal insulation. Unfortunately, the lighting may be replaced with a low performance product when it's relatively short life ends, while the low performing facade will be working against the buildings overall energy performance for a very long time.

EF 3: **SYSTEM LIFETIMES**



EF 3

Limit Heat Loss Through Exterior Walls

Issue:
Building envelope design has a major impact on both heat loss in winter and solar gain in summer. Using the flexibility in current energy codes, designers can meet energy-efficiency requirements by trading off the efficiency of mechanical and lighting equipment against the thermal integrity of the envelope. Since the building envelope will be in use for a century or more, this trade-off is short-sighted.

Recommendation:
Establish fixed performance requirements for building envelopes with respect to heat loss, independent of mechanical and lighting equipment choices.

Benefits

Savings
Health & Safety
Environment

Costs

Cost

EF 4

Promote Super-Insulated Exterior Walls

Issue:
The City's definition of "floor area," which determines how large a building can be, includes exterior wall thickness. This penalizes thick, energy-efficient walls, and rewards poorly insulated thin-wall construction.

Recommendation:
For super-insulated walls, exclude up to eight inches of the exterior wall thickness from the "floor area" calculation.

Benefits

N/A Savings
Health & Safety
Environment

Costs

Cost

EF 5

Allow External Insulation Beyond Zoning Limits

Issue:
Insulating the exterior of a building is often the most effective way to reduce heat transfer and fuel consumption. But many buildings are built up to the zoning setbacks, making it impossible to add insulation to the exterior.

Recommendation:
Allow exterior insulation on existing buildings to extend into side and rear yard setbacks.

Benefits

N/A Savings
Health & Safety
Environment

Costs

Cost

EF 6: **Solar shades were a common feature in New York City prior to the advent of air conditioning systems, as seen in this photo of an awning-encrusted Flatiron building.**

Passive Shading.

Properly designed exterior solar shades can decrease air conditioning loads 30%-60%, can lower room temperatures as much as 25 degrees and have the greatest impact at times of peak energy demand, like a midday in summer.

EF 6

Increase Allowable Size of Solar Shades

Issue:
Shading devices help combat heat gain and prevent glare, decreasing cooling energy requirements. The Building Code only permits these shading devices to extend 10 inches from the building, thus restricting their effectiveness. They are also not "permitted obstructions" under the Zoning Resolution.

Recommendation:
Treat shading devices the same as awnings and canopies, which are permitted to extend five feet from the building. Also add these devices to the list of "permitted obstructions" in the Zoning Resolution.

Benefits	Costs
N/A Savings	Cost
Health & Safety	
Environment	

EF 7

Minimize Air Leakage Through Building Exteriors

Issue:
Energy code requirements for air barriers are insufficient to prevent air leakage both in and out of buildings. An effective air barrier permits controlled levels of ventilation, prevents drafts, lowers heating loads and contributes to overall energy savings.

Recommendation:
Strengthen the energy code to include requirements for more-effective air barriers.

Benefits	Costs
Savings	Cost
Health & Safety	
Environment	

EF 8

Provide Window Screens to Encourage Natural Ventilation

Issue:
Many people do not open their windows in the summer due to concern for insect bites, but this also prevents the use of natural, energy-free ventilation. This issue is likely to become more important in the future as climate change expands the habitat of tropical insects.

Recommendation:
Provide fitted window screens on all new windows at seven stories or lower. Beginning in 2016, provide expandable screens on request for all windows.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

EF 10

Reduce Artificial Lighting In Sunlit Spaces

Issue:
Many of New York's buildings have been designed to maximize daylight in interior spaces. However, these buildings often waste energy by using artificial light when daylight could provide much of the required illumination.

Recommendation:
Require daylight responsive controls that reduce artificial light when sufficient daylight is present.

Benefits

Savings

Health & Safety

Environment

Costs

Cost

EF 9

Ensure Operable Windows in Residential Buildings

Issue:
Operable windows permit cooling without power, which saves energy and allows buildings to remain habitable during power outages. Builders have misinterpreted Health Code regulations to limit window openings to 4.5 inches, which is inconsistent with the Building Code.

Recommendation:
DOB should require documentation showing that residential properties provide window openings as required by code, counting only the actual area that can be opened with window stops, if stops are provided.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

Daylight = Free Lighting

Numerous studies have documented lighting energy savings in excess of 30% for daylight-responsive lighting controls in commercial spaces.

EF 11

Reduce Summer Heat with Cool Roofs

Issue:
Light-colored roofs reflect light and heat back into the atmosphere, thereby cooling buildings and cities. The building code mandates white roof coatings, but the standards are not aligned with LEED, which is used by many developers.

Recommendation:
Amend specifications for cool roof coatings to align them with LEED.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

EF 11: **White roofs are an inexpensive way to reflect heat away from our cities.**

EF 12

Reduce Summer Heat with Cool, Shady Building Lots

Issue:
Unbuilt areas on private building lots make up approximately one third of New York City's space. Because these areas are often covered in dark, unshaded pavement, they contribute to the city's heat island.

Recommendation:
Require light-colored pavement, trees or plantings on 50% of the unbuilt areas of building lots.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

EF 13

Clarify Standards for Attaching Rooftop Solar Panels

Issue:
The Building Code does not specify acceptable criteria for the attachment of solar panels to rooftops, inhibiting the installation of solar energy systems.

Recommendation:
Require the Department of Buildings to develop detailed criteria for roof attachment of solar panels.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

Solar Energy When We Need It Most.

Distributed solar panels reduce our reliance on aging power transmission grids and produce the most energy when chances of a blackout or brownout are highest- on hot days in mid-summer.

EF 14: **Solar panels on the roof of Silvercup Studios in Brooklyn.**

EF 14

Allow Large Solar Rooftop Installations

Issue:
Current regulations limit the area of roof that solar panels can cover without counting as another floor. This can increase the effective cost of solar panels, or prevent their installation.

Recommendation:
Exempt solar panels from limits on rooftop coverage.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

EF 15

Remove Zoning Impediments to Alternative Energy

Issue:
The Zoning Resolution allows many categories of mechanical equipment on a roof to exceed the allowable building height. However, equipment used for alternative or distributed energy is not treated as such a "permitted obstruction."

Recommendation:
Treat alternative and distributed energy equipment, such as photovoltaic and solar thermal collectors, as "permitted obstructions."

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

EF 16

Remove Landmarks Impediments to Alternative Energy

Issue:
In historic districts, rooftop equipment – including solar panels, wind turbines and micro-turbines -- is not permitted if visible from the street without a lengthy review by the Landmarks Preservation Commission.

Recommendation:
Treat alternative and distributed energy equipment the same as other rooftop mechanical equipment, which is allowed to be visible from the street.

Benefits		Costs	
N/A	Savings		Cost
	Health & Safety		
	Environment		

Energy From "Away"

Even though NYC generates a significant portion of it's own energy, the great majority of electrical power is delivered to the city through a transmission grid that collects energy from distant power plants. As much as 70% of the fuel consumed in the generation of power for the grid is lost during generation and transmission. Removing impediments to renewable energy within NYC will make the power grid more reliable, reducing the risk of blackouts and brownouts.

EF 17

Allow Use of Biofuels

Issue:
Biofuels can create energy from waste, while reducing resource consumption and air pollution. However, they are not permitted under the Mechanical Code.

Recommendation:
Revise the definition of fuel oil to allow the use of alternative fuels.

Benefits		Costs	
N/A	Savings		Cost
	Health & Safety		
	Environment		

Heating Oil And Air Quality.

Heating oil, primarily #4 and #6 oil, is responsible for 14% of local emissions of fine particulate matter (known as PM 2.5) with high levels of nickel, vanadium and elemental carbon. Because of heating oil and other sources, New York City does not comply with federal Clean Air Act standards for PM 2.5. The burning of heating oil emits large quantities of particulate matter because of its high sulfur content- heating oil contains 2000-3000 parts per million of sulfur compared with just 15 parts per million for on-road diesel.

ENERGY & CARBON EMISSIONS

ENERGY EFFICIENCY

The first and least expensive route to reducing greenhouse gas emission is through greater energy efficiency. If less fuel is burned and less electricity consumed, emission levels can only decline. A 2009 study of U.S. energy use by management consultants McKinsey & Company demonstrated that cost-effective reductions in carbon emissions of 20 percent below 2008 levels would be possible by 2020 in the residential and commercial sectors (excluding transportation). While greater reductions will be required in later years, this would be a good start. New York City can likely exceed this reduction, since the city's buildings contain systems, some in operation for a full century, that were designed when fuel was far cheaper than it is today. Many of these systems are overdue for replacement simply because they have exceeded their useful service life.

The proposals in the *Energy & Carbon Emissions: Energy Efficiency* chapter aim to ensure that these replacements are done early and well, and that the replacements also use a wide range of strategies to increase the energy efficiency of buildings. Even within the building sector, energy is used in myriad ways for a broad spectrum of purposes. Any attempt to lower consumption will involve many different technologies, many different building types, and many different governing rules. It is no surprise, then, that this chapter includes nearly 30 independent proposals.

The proposals fall into several categories. First, sensors and controls would be required in several applications where they are now optional; in this way, buildings would no longer illuminate, heat, ventilate or cool empty spaces. Second, while equipment standards have remained static for years, even decades, available equipment has improved dramatically; in these cases, proposals tighten numerical efficiency standards. For example, one proposal aims to encourage the use of Energy Star appliances. Another requires that when homes are sold, basic energy and water conservation steps, such as caulking windows and insulating roofs, will be undertaken. A third group of proposals expands the use of building commissioning and increases inspections to ensure that equipment functions as designed.

Some proposals encourage the use of efficient equipment by clarifying or updating existing code requirements, including boiler regulations based on test equipment from the 1960s. Also, because proper planning and accurate assessments of energy needs during design is important for efficiency, two proposals would require new reporting or analysis. In addition, substantial energy is sometimes wasted due to simple bad practice, so two proposals seek to minimize this. One requires the recovery of heat from utility steam condensate; the other, that pipes be insulated whenever they are exposed during construction activity. Finally, other proposals address the very large quantities of greenhouse gasses generated by cement production. These proposals aim to lower the amount of cement required in concrete to levels that, while consistent with safety and longevity, still provide substantial reductions in the emissions associated with a given project.

Energy & Climate Change.

Energy-related carbon dioxide emissions from the combustion of petroleum, coal, and natural gas represent roughly 80% of U.S. greenhouse gas emissions.

EE 1

Improve Energy Modeling for Building Design

Issue:
ASHRAE 90.1 allows designers to follow a prescriptive path or to use energy modeling to demonstrate compliance. Energy modeling, however, is prone to manipulation because it lets enhanced efficiency in one energy system be traded off against poor efficiency in another system.

Recommendation:
Require projects using energy modeling to demonstrate design energy use that is 14% lower than the prescriptive path.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 2

Improve Analysis of Heating & Cooling Needs During Design

Issue:
Equipment used to heat and cool buildings is often over-sized, resulting in operating inefficiency. To size the equipment appropriately, it is important to accurately calculate the peak heating and cooling load demands of buildings.

Recommendation:
As part of the plans submitted to the Department of Buildings for approval, require detailed calculations of peak heating and cooling loads.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 4

Improve Energy & Water Efficiency upon Sale of Residences

Issue:
Housing stock accounts for over 37% of the total energy consumed in NYC. Year after year, these properties are renovated before or after they are sold. But typically, these renovations do not include cost-effective energy or water efficiency improvements.

Recommendation:
Require one-to two-family houses and apartments to implement simple energy and water conservation measures at the time of sale and major renovation, unless a property has been sold under financial distress.

Benefits

- N/A Savings
- Health & Safety
- Environment

Costs

- Cost

EE 3

Assess Co-generation Feasibility in Large Buildings

Issue:
Properly designed co-generation systems are roughly twice as efficient as electricity from the grid because these systems utilize waste heat from electric generation. Owners are often unaware of the potential for co-generation in their buildings.

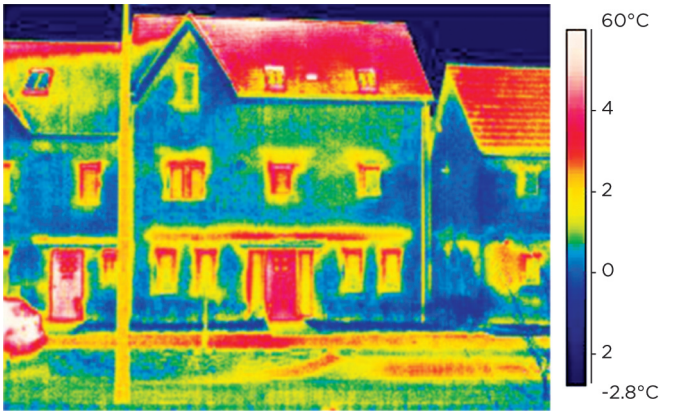
Recommendation:
Require new developments of 350,000 square feet or more to analyze the potential for co-generation.

Benefits

- N/A Savings
- Health & Safety
- Environment

Costs

- Cost



EE 4: **An infrared image of a home in winter, showing heat loss through a poorly insulated roof and around door and window openings. There are many inexpensive measures available that can vastly improve the performance of our housing stock.**

EE 5

Improve Efficiency of Boilers & Heating Distribution Systems

Issue:
The energy code permits the use of inefficient boilers and heat-distribution systems.

Recommendation:
Establish higher-efficiency standards for heating systems. Also, prohibit the installation of new one-pipe steam systems and other inefficient systems.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

Housing Performance.

Simple energy and water efficiency measures implemented when a home or apartment is sold can have a dramatic and positive impact on the performance of our housing stock for about 1/5th the typical cost of brokerage services.

EE 6

Increase Efficiency of Large Cooling Systems

Issue:
Air conditioning is responsible for approximately 17% of electricity use in New York office buildings. Buildings often install inefficient air conditioning systems, resulting in excessive electric demand and usage.

Recommendation:
Steer buildings toward more-efficient air conditioning by prohibiting outdated, inefficient cooling equipment and limiting the use of other equipment associated with inefficient systems.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 7

Increase Lighting Efficiency in Apartment Buildings

Issue:
The current lighting requirements in the Housing Maintenance Code for hallways, stairs, and common laundry facilities reference an old terminology for lighting, the use of incandescent lights. They also imply that the lights in hallways, stair, and common laundry facilities should always be fully on.

Recommendation:
Update the language in the code to match other city codes, particularly the energy code. Specify a minimum efficacy for light bulbs, and expressly allow bi-level lighting for hallways and stairs, and occupancy sensors for laundries.

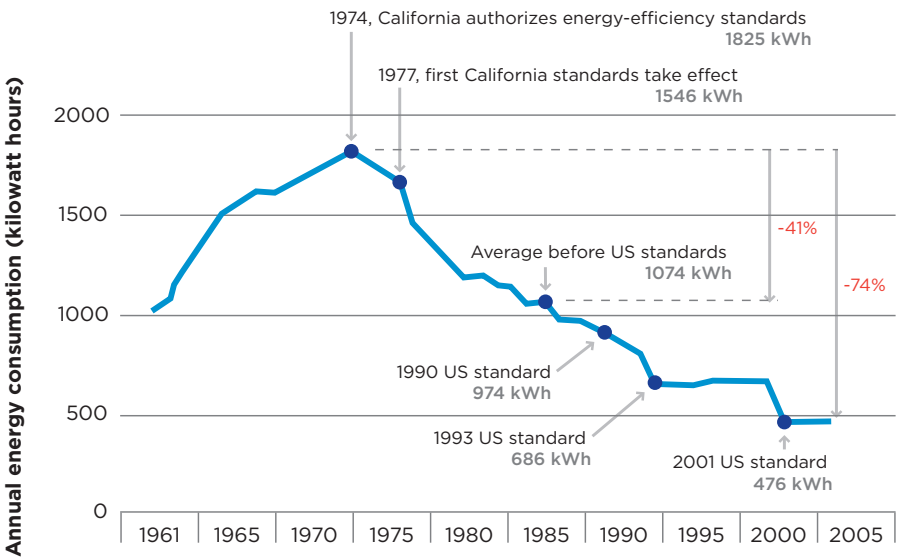
Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 8: **AVERAGE ENERGY CONSUMPTION OF NEW REFRIGERATORS IN THE US**



EE 8

Encourage Installation of Energy Star® Appliances

Issue:
Home appliances, such as refrigerators, freezers, dishwashers and clothes washers, are a significant contributor to building energy consumption. Energy Star® appliances are more efficient, and they are readily available.

Recommendation:
Require owners of buildings and apartments undertaking kitchen and/or laundry facility construction to either purchase Energy Star® appliances or undertake alternate energy-saving measures.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 9

Improve Operation of Dryers in Apartment Buildings

Issue:
Shared clothes dryers in multifamily residential properties have a large energy impact because they are heavily used. Many dryers sell drying time in large increments (45 minutes to an hour), causing the dryer to run longer than necessary.

Recommendation:
Require dryers to sell time in increments of 15 minutes or less

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 10

Reduce Overheating in Apartments

Issue:
Many apartment residents have little or no control over individual radiators in their living spaces. This results in overheating in the winter. Residents then open windows and waste energy.

Recommendation:
Over a 10-year period, phase-in individual room or apartment temperature controls in residential buildings.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 11

Turn Off Equipment in Empty Hotel Rooms

Issue:
Lights, televisions, air conditioners and heating systems are often left running in unoccupied hotel and motel rooms.

Recommendation:
Require a master switch, such as a room key control, that automatically turns off lighting and televisions, and reduces heating or cooling when rooms are vacated.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 12

Provide Ventilation Air Only as Needed in Large Spaces

Issue:
HVAC systems typically provide outdoor air based on maximum occupancy, wasting energy when rooms are partially occupied or empty. Demand control ventilation adjusts the amount of air pumped into rooms as needed.

Recommendation:
Require demand control ventilation for large spaces of variable occupancy.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 13

Use Manual On - Auto Off Lighting

Issue:
Occupancy sensors turn on lights when a room is entered, then turn them off after people have departed. This does not maximize energy savings because light is not always needed at entry, if the use is transitory or daylighting is available.

Recommendation:
Require vacancy sensors, which contain a manual On switch, coupled with an occupancy sensor that turns lights off after a period of vacancy.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 14

Limit After-Hours Retail Lighting

Issue:
Many retail establishments in New York City light their spaces all night long. This wastes energy, especially because stores often use high-wattage fixtures.

Recommendation:
Require retail lighting, other than lighting used in window displays or for egress, to be turned off when stores are unoccupied.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 15

Reduce Artificial Lighting in Sunlit Lobbies & Hallways

Issue:
The building code mandates excessive lighting for egress spaces and that they be illuminated by artificial means even when the space is daylit or unoccupied.

Recommendation:
Align NYC egress illumination requirements with national standards and allow natural light to supply the required illumination, while maintaining current NYC standards when spaces are occupied.

Benefits

- N/A Savings
- Health & Safety
- Environment

Costs

- Cost

EE 14: **Many retailers leave virtually all their interior lighting on while the store is closed.**

EE 16

Increase Lighting Efficiency on Construction Sites

Issue:
The standards for temporary lighting on construction sites are outdated, allowing for inefficient fixtures and wasteful practices.

Recommendation:
Update the efficiency standards for lighting on construction sites, provide separate circuits for life-safety lighting and let natural light illuminate foot bridges, temporary walkways and sidewalk sheds.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 17

Use Outdoor Air for Cooling

Issue:
Buildings can be cooled using outside air when temperatures are sufficiently low. ASHRAE 90.1 does not require this energy-efficient practice in New York City's climate zone.

Recommendation:
Require that new HVAC systems be capable of utilizing outside air for cooling, when temperatures permit.

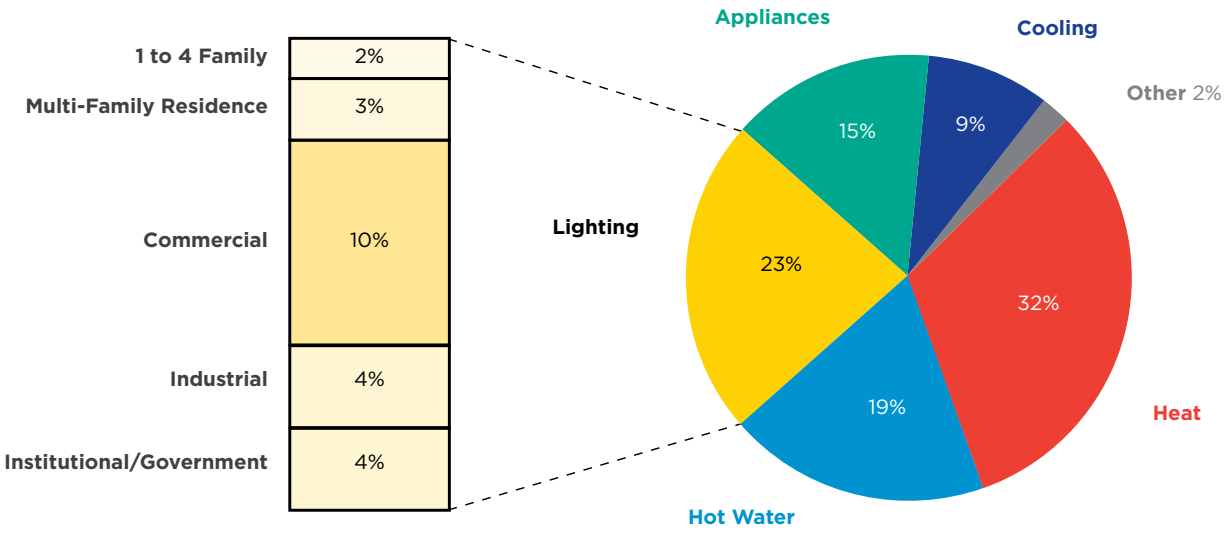
Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 15: **ENERGY USE IN NYC BUILDINGS**



Using Fresh Drinking Water To Cool Steam.

Buildings that use Con Edison district steam for space heating or cooling dispose the resulting condensate into the City sewer. However, the condensate must be cooled from its normal 212° F to 150° F before it can be disposed. This is typically done by adding fresh drinking water to the steam condensate- wasting both energy and water. A 100 unit residential building might use 7500 million Btu of steam in a year. The EE18 proposal would save this hypothetical building 550 million Btu of steam and eliminate the waste of over 700,000 gallons of water.

EE 18

Use Waste Heat from ConEd Steam

Issue:
Energy is wasted due to the dumping of hot condensate from purchased Con Edison steam. In addition, substantial potable water is wasted cooling the condensate to 150 degrees F. before it is dumped in the sewer.

Recommendation:
Require all new or reconstructed heating systems that use Con Edison's steam to maximize the recovery of heat from steam condensate. Doing so will lead to significant savings of energy and water.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 19

Insulate Pipes Exposed During Construction

Issue:
Pipe insulation is a cost-effective measure to improve energy efficiency. While it is required for new construction, most pipes in existing buildings lack this beneficial insulation.

Recommendation:
Require that all pipes exposed during renovations be insulated.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 20

Clarify Standards for Equipment Venting

Issue:
Venting boilers to the sidewalls of buildings encourages the use of efficient appliances by reducing costs. However, sidewall venting is often rejected by building inspectors for reasons that are not clearly delineated by any agency guidelines.This creates an uncertainty that discourages contractors from installing efficient equipment.

Recommendation:
Establish physical criteria that clarify when sidewall venting is allowable and ensure these criteria are consistent with national practice

Benefits

- N/A Savings
- Health & Safety
- Environment

Costs

- Cost

EE 21

Modernize Boiler Regulations

Issue:
NYC's boiler regulations were written in 1973, and are based on now outmoded technology.

Recommendation:
A dedicated task force -- including boiler experts, DEP Air Engineering Staff, and members of the Green Codes Task Force -- should review existing boiler regulations and propose revisions.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

EE 22

Reduce Lighting Power Requirements for Offices

Issue:
An outmoded provision of the Electrical Code mandates that spaces have capacity to deliver three times the power for lighting as is allowed under the Energy Code. This increases cooling load requirements, necessitating oversized, expensive HVAC systems.

Recommendation:
Reduce the required lighting power capacity to better align with the Energy Code.

Benefits

Savings

Health & Safety

Environment

Costs

Cost

Recycled Materials In Concrete.

Cement manufacturing is responsible for up to 5% of global carbon emissions and is the largest source of U.S. emissions after fossil fuel consumption. Fly ash can replace up to 50% of Portland cement in concrete mixtures, while blast furnace slag can replace up to 80%.

EE 23

Reduce CO2 Emissions Due to Concrete

Issue:
Manufacturing cement, a significant component of concrete, requires large amounts of energy that produce significant quantities of CO2. Cement can easily be replaced in concrete with less energy-intensive materials.

Recommendation:
Limit the amount of cement permitted in concrete, substituting other cementitious materials, such as readily available industrial by-products.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

EE 24

Reduce CO2 Emissions From Specialized Concrete

Issue:
The NYC Building Codes currently limits the amount of recycled material that can be used in concrete exposed to de-icing chemicals.

Recommendation:
Increase the maximum percentage of recycled material that be used in concrete.

Benefits

N/A Savings

Health & Safety

Environment

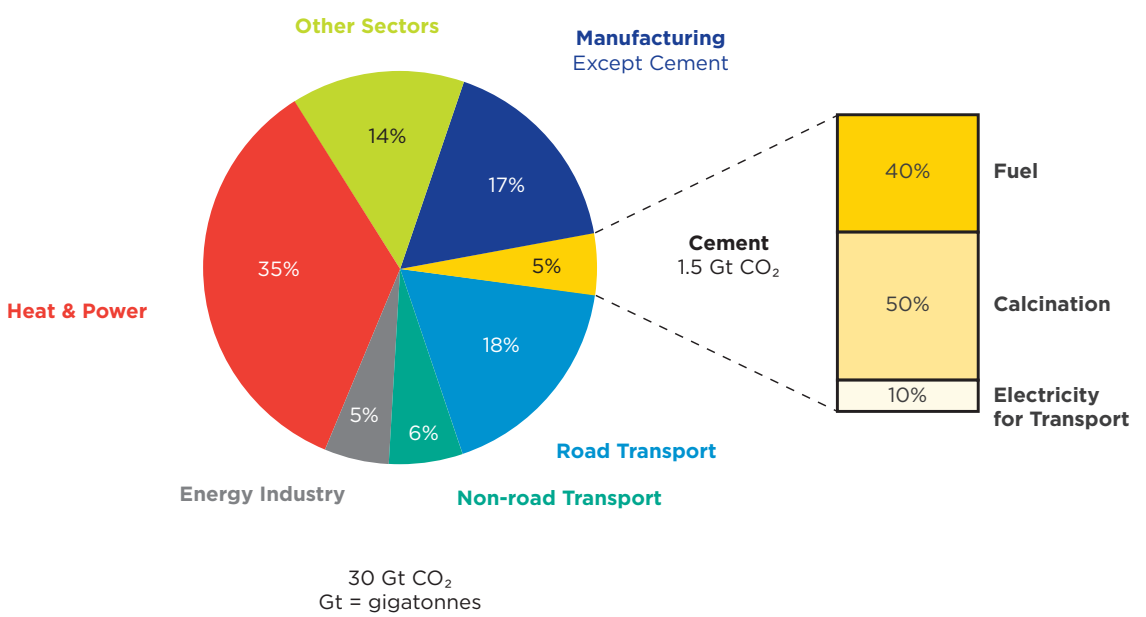
Costs

Cost

Lighting the Way.

Lighting accounts for 16% of New York City's CO2 emissions. Proposal EE 26 is estimated to provide lighting energy savings of 5-15% with a financial payback of less than three years.

EE 24: **SOURCES OF GLOBAL CO2 EMISSIONS**



EE 25

Ensure New Energy Systems Function Properly

Issue:
Commissioning is a quality assurance process that is not typically done on building systems. Although often omitted, commissioning helps identify and correct deficiencies in design or installation, resulting in higher energy efficiency and building performance.

Recommendation:
Require commissioning in all new construction, substantial renovations, and additions of greater than 50,000 square feet. Also, require building acceptance testing ("commissioning light") for projects between 5,000 square feet and 50,000 square feet.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 26

Ensure Lighting Systems Function Properly

Issue:
Increasingly, lighting systems rely on sophisticated sensors and controls to reduce energy consumption. These systems must be tested and adjusted after installation to ensure that they function properly; unfortunately, this is not common practice.

Recommendation:
Require functional testing of lighting sensors and controls to ensure that the systems perform as designed.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 27

Reduce Leakage from Air Ducts

Issue:
Energy is wasted when air ducts leak and vents are improperly adjusted.

Recommendation:
Test and seal all ventilation ducts, and adjust vents in new construction or renovations.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EE 28

Expand Boiler Efficiency Testing & Tuning

Issue:
The Department of Environmental Protection tests boiler combustion efficiency only in very large boilers, and only every three years. Annual testing would detect malfunctions, permit tuning, and result in more efficient boiler operation.

Recommendation:
Require annual testing of boilers that generate more than 2 million BTU per hour or are located in buildings larger than 50,000 square feet. Also require boiler cleaning, tuning and repairs as necessary. The issue addressed by this proposal is already under consideration by the City.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

ENERGY & CARBON EMISSIONS

OPERATIONS & MAINTENANCE

The most immediate and promising route to reducing building fuel, electricity use and carbon emissions lies in more efficient operation of existing buildings. Most buildings consume more energy than necessary, often substantially more. The range in performance is enormous: The least efficient existing buildings use three to five times more energy than the most efficient buildings. Even among new buildings, marked discrepancies exist between design expectations and actual energy use. What's more, existing buildings are here to stay: It's estimated that 85 percent of the buildings that will constitute New York City's real estate in 2030 are already standing today.

Much of the variation in energy use among buildings and between an individual building's design and actual usage is due to differences in operations. This includes both decisions on when to replace aging capital equipment and day-to-day operating schedules and maintenance choices. Mismatches between the requirements of efficient operation and the resources made available are frequent. These occur because buildings are large, complex entities that require constant control and correction.

Building operations are often neglected, and maintenance is frequently deferred, steps that can lead to excessive energy use and high operations expenses. The reasons are many. For one, building residents and management alike tend to judge a building's performance by its level of comfort and reliability, rather than its energy efficiency. Also, energy and water costs are modest when compared with such expenses as mortgages, salaries and taxes; as a result, these costs are often paid less attention. In many commercial buildings, there are split incentives: If leases include energy expenses as a mark-up on the utility's bill, then the owner has little reason to promote efficient operations in the tenants' spaces. Finally, New York City's elaborate codes and laws governing buildings have overwhelmingly focused on assuring health and safety, rather than energy efficiency.

That said, there are some initiatives aimed at improving operations and maintenance in New York City buildings. For example, the U.S. Green Building Council's LEED for Existing Buildings: Operations and Maintenance program provides nationally recognized certification that a building is being run efficiently. So does the U.S. Energy Star program for buildings. On the training front, local labor unions have established a wide variety of programs, including the Service Employees International Union's Local 32BJ's Thomas Shortman Training Program and the associated 1000 Green Supers initiative. Other training programs include Local 94 Operating Engineers' suite of training courses, and the International Union of Operating Engineers Local 30's Apprentice Training and Skill Improvement Training courses. These have all provided valuable improvements in the capabilities of New York City's building operators.

The proposals in this section would increase awareness of energy use by tenants and building operators. If approved, meters will be required to measure electricity use by major systems and tenant spaces, and automated energy tracking will be required for new, large buildings. Ready access to this information would increase the attention placed on energy efficiency and speed the detection of leaks and other malfunctions. One proposal would establish reasonable limits on heating and cooling temperatures, hopefully putting an end to the need to wear sweaters inside of freezing movie theatres during the dog days of summer. Finally, the proposals aim to improve building operations and maintenance through the training of building operators, regular inspections, and periodic tune-ups of building systems.

EO 1

Re-tune Large Buildings Every Seven Years

Issue:
Even the best-designed building systems drift away from optimal performance over time, due to broken parts, changes in use, and the accumulation of small changes in procedures and equipment.

Recommendation:
Every seven years, buildings larger than 50,000 square feet must be retro-commissioned, re-tuning the major building systems to ensure they all work together correctly. A similar proposal was incorporated into the Greener, Greater Buildings Plan, which became law prior to the issuance of this report.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EO 2

Measure Electricity Use in Tenant Spaces

Issue:
Because electricity is often unmetered in commercial tenant spaces, tenants are unaware of the energy they consume. This, in turn, can lead to excessive use and waste.

Recommendation:
All new commercial tenant spaces of 10,000 square feet or larger shall be metered for electricity. A similar proposal was incorporated into the Greener, Greater Buildings Plan, which became law prior to the issuance of this report.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EO 3

Train Building Operators in Energy Efficiency

Issue:
Current requirements for building operators do not include training in efficient building operations, energy efficiency, or monitoring of overall building performance.

Recommendation:
In buildings larger than 50,000 square feet, require operators to be trained and certified for energy-efficient operations. Fund a study to establish the appropriate training and certification requirements.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

Awareness = Efficiency

New York State studies have shown that metering tenant electrical use in a multi-famliy building can reduce apartment electricity consumption by approximately 17%-27%.

EO 4

Automate Tracking of Building Energy Use

Issue:
Many building managers and operators do not know how efficiently (or not) their buildings' energy systems are performing. This can lead to poor performing systems and missed opportunities for energy savings.

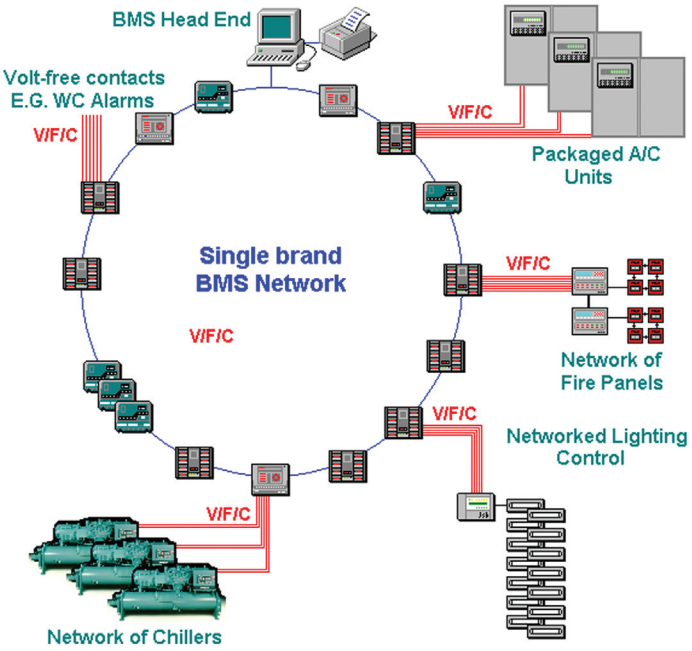
Recommendation:
For all new buildings of 50,000 square feet and larger, require computerized building control systems that capture energy data and provide useful information to building managers and operators.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost



EO 4: **A diagram of a typical building management system.**

EO 5

Inspect & Maintain Commercial HVAC Systems

Issue:
Without routine inspection and maintenance, HVAC systems do not deliver on energy efficiency, thermal comfort and indoor air quality.

Recommendation:
Adopt ASHRAE 180P for the inspection and maintenance of HVAC systems in commercial buildings.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

EO 6

Establish Maximum Heating & Minimum Cooling Temperatures

Issue:
The City Multiple Dwelling Law requires a minimum indoor temperature during the heating season. However, there is no maximum temperature, allowing for overheated buildings. In addition, there are no temperature regulations during the cooling season.

Recommendation:
Undertake a study on the feasibility of limiting heating in winter and cooling in summer from central systems.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

BUILDING RESILIENCE

Because many of New York's historic buildings were built before the era of cheap energy and air conditioning, they were designed to utilize available daylight and provide natural ventilation. In fact, access to light and air were required in a series of landmark tenement laws. Since the Second World War, however, New York's buildings have become increasingly dependent on electric lights, mechanical equipment and externally supplied energy; in effect, these buildings are on life support. As Hurricane Katrina demonstrated, such buildings quickly become intolerable or uninhabitable when their energy supply goes down.

New York City, actually an archipelago with more than 580 miles of coastline, is exceptionally susceptible to flooding and, with precious little margin in electrical power capacity, is vulnerable to power disruptions. New York's buildings need to both house the population during emergencies and quickly recover functionality; the threats of climate change and terrorism increases the likelihood that we will need buildings to serve as refuge. Developing resilience at the building scale will complement other efforts, led by the New York Mayor's City Office of Long-Term Planning and Sustainability, to coordinate the protection of the city's infrastructure, such as the power grid, sewage system, and transportation system.

Considerations about building resilience are relatively new, unlike many other green building strategies, which have been carefully developed by the building industry over many years, incorporated into LEED, and widely accepted as best practices. Therefore, this section includes several studies that would recommend policy changes, along with specific proposals that are ready for enacting now.

Among these proposals, one group addresses flooding, in part by offering requirements that would both augment the building code's new section on flooding and redefine the flood plane. A second group of proposals address building habitability in the event of a power loss; these range from "passive survivability," in which buildings can retain their functionality even without their energy systems, to full emergency back-up systems. Another proposal would study other, lesser-known impacts of climate change on buildings, including the impact of rising sea levels, stronger winds and wetter conditions.

BR 4: **New York City, NY – 3.0-meter sea level rise.**
Source: ©2007-2010 2030, Inc. / Architecture 2030. Data Source: USGS 10M DEM.3

BR 1

Create & Use 2080 Flood Map Based on Climate Change Predictions

Issue:
Current flood maps are based entirely on historical data and do not account for the predicted sea-level rise due to climate change and coastal flooding that would ensue.

Recommendation:
Develop flood maps that reflect sea-level rise and increases in coastal flooding through 2080. New developments susceptible to future 100-year floods should meet the same standards as buildings in the current 100-year flood zone.

Benefits

N/A Savings

Health & Safety

Environment

Costs

N/A Cost

BR 2

Safeguard Toxic Materials Stored in Flood Zones

Issue:
The New York City Department of Environmental Protection requires facilities that store hazardous chemicals to file a risk management plan, but it does not require any special provisions for chemicals stored within the 100-year floodplain.

Recommendation:
Require toxic materials within the 100-year floodplain to be stored in a floodproof area.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

BR 3

Study Adaptive Strategies to Flooding

Issue:
Current building codes and zoning regulations have not been examined and modified as necessary in the context of rising sea levels and increased frequency of flooding. In addition, strategies that could increase safety may have the unintended consequence of undermining urban design quality.

Recommendation:
The city should undertake a study to determine how the building code and zoning resolution should be strengthened to protect buildings from sea-level rise and flooding. Also, the city should study urban-design strategies to ensure that streetscape vitality is not a casualty of these proactive measures.

Benefits	Costs
N/A Savings	N/A Cost
Health & Safety	
Environment	

New York to North Carolina.

With 580 miles of coastline, New York may be impacted more than any other U.S. city by sea level rise. According to the New York City Panel on Climate Change, by 2080 sea levels could rise by 12-23 inches and New York City's climate will be closer to present-day North Carolina.

BR 4

Study Adaptive Strategies to Non-Flood Climatic Risks

Issue:
Current building codes and zoning regulations are based on historic data and do not consider the potential impacts of climate change on existing and future development.

Recommendation:
Based on the hazard zone maps and risk assessments developed in the study on non-flood climatic hazards, undertake a further study to recommend building code and zoning changes to diminish the impacts of those hazards.

Benefits	Costs
N/A Savings	N/A Cost
Health & Safety	
Environment	

BR 5

Forecast Non-Flood Climatic Hazards to 2080

Issue:
New York City will face a series of risks associated with climate change whose impact has not been adequately studied. These risks include rises in the groundwater table, increased wind velocities, changes in rainfall, heat waves, electrical grid disruptions, increased humidity and other extreme weather events.

Recommendation:
Study climate risks to buildings through 2080. Determine whether impacts will vary across the city or have a uniform impact; then, define and map hazard zones in the city based on the risk of these climatic effects.

Benefits	Costs
N/A Savings	N/A Cost
Health & Safety	
Environment	

BR 6

Analyze Strategies to Maintain Habitability During Power Outages

Issue:
Research on climate change indicates that there will be an increase in the frequency and severity of events that can disrupt the city's power, water, sewer and transportation infrastructure. In the event that city services are not usable, passive and dual-mode functions will be critical.

Recommendation:
Undertake a comprehensive study of passive survivability and dual-mode functionality, then propose code changes to incorporate these concepts into the city's building codes. Also include a study on refuge areas in sealed buildings.

Benefits

N/A Savings

Health & Safety

Environment

Costs

N/A Cost

BR 8: **Rooftop water towers have long been a fixture of the New York City skyline and, unlike pump driven systems, can help ensure access to potable water during a crisis.**

BR 7

Ensure Toilets & Sinks Can Operate During Blackouts

Issue:
Some toilets and faucets can function only with utility power; this presents a sanitation risk in the event of a long-term power outage.

Recommendation:
Require that toilets and faucets be capable of operating without building power for at least two weeks.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

BR 8

Enhance Building Water Supply During Blackouts

Issue:
Water towers are an energy-efficient method for providing water pressure and ensuring access to potable water during short power losses. The building codes do not require water towers for new construction, and they allow the towers to be removed from existing buildings.

Recommendation:
Prohibit the removal of existing water towers, and require water towers in all new and renovated buildings.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

BR 9

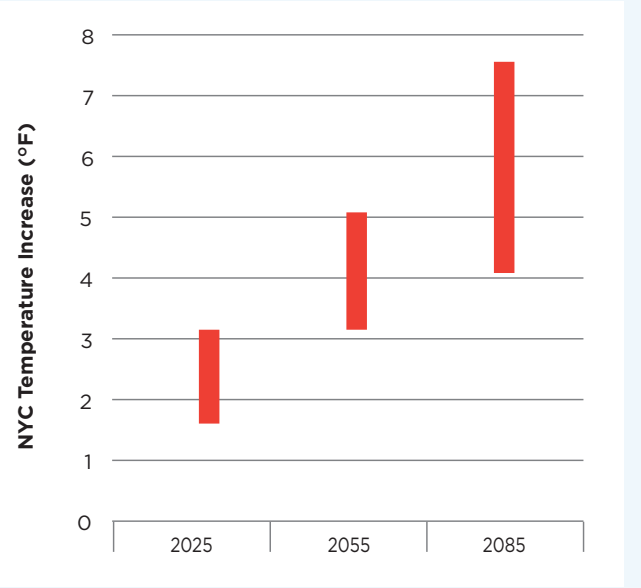
Include Climate Change in Environmental Impact Statements

Issue:
"CEQR" is the process by which city agencies review proposed actions in order to identify the effects those actions may have on the environment. CEQR guidelines are currently being updated to include an assessment of the impact of climate change on proposed actions.

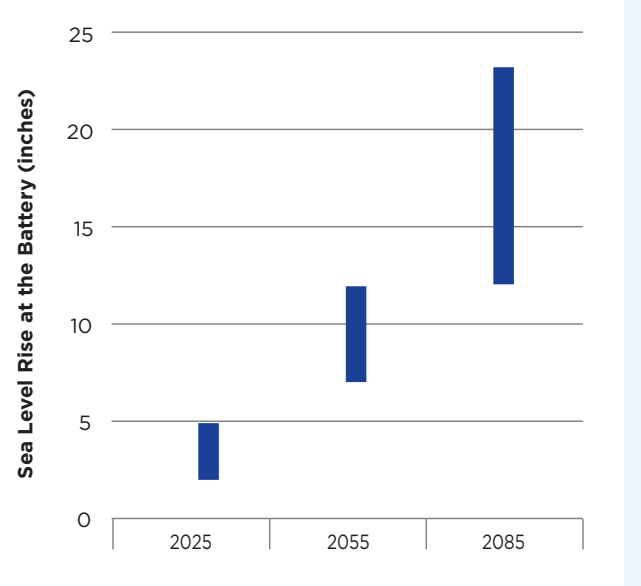
Recommendation:
The technical committee supports the amendments to the CEQR guidelines underway in the Mayor's Office of Environmental Coordination, which will incorporate climate change. The issue addressed by this proposal is already under consideration by the City.

Benefits	Costs
N/A Savings	Cost
Health & Safety	
Environment	

BR 9: **PROJECTED NYC TEMPERATURE RISE**



BR 9: **PROJECTED NYC SEA LEVEL RISE**



RESOURCE CONSERVATION

Of all the materials consumed globally, a total of 40 percent, or roughly 3 billion tons a year, are used in the construction of buildings.1 This massive flow of materials generates major environmental impacts at every stage in the production cycle. For example, the clear-cutting of forests for wood can lead to deforestation, while the extraction of minerals often involves harmful strip-mining and the contamination of waterways. Similarly, the manufacturing and transport of construction materials consumes both energy and water resources while creating pollution. Finally, construction debris constitutes as much as 45 percent of all solid waste around the country.2 In New York City, the proportion is even higher – over 60 percent-- due to minimal yard waste and the city's high density.3

Many strategies are available for reducing the impacts associated with building materials. Consumption can be reduced by first using longer-lasting materials to construct buildings and then maintaining them. Many materials can be reused, giving them a second life. Others can be recycled and used as raw inputs for new materials. Still other materials can be extracted using sustainable methods. All these approaches can help the environment, and all can be implemented using proven building materials and practices.

The proposals in the *Resource Conservation* chapter concentrate on the reuse and recycling of construction waste. Since this part of the materials cycle occurs within the city, it can therefore be managed by city regulations. In general, New York City's waste-processing system relies on the off-site separation of mixed construction debris at waste processing yards, or "transfer stations," and it does a surprisingly good job: New York recycles roughly 70 percent of its construction debris, equivalent to nearly two LEED points.4 But because some highly recyclable materials are too fragile to survive this system, one proposal requires that these products be site-separated. Also, because other waste materials are produced in greater quantities than the current system can absorb, several proposals would require the reuse of this waste in the production of new materials. Additionally, one proposal aims to expand the use of sustainably harvested wood. Yet another would require the addition of recycling areas to residential projects because buildings with dedicated recycling areas have much higher recycling rates than those without them.

RC 1

Recycle Construction Waste

Issue:
While most waste from construction sites can be collected in dumpsters and then separated and recycled off-site, certain materials become damaged when comingled. They cannot be reused or recycled unless they are separated at the construction site.

Recommendation:
Require ceiling tiles, carpeting, new gypsum wallboard scrap and large-dimension lumber to be sorted on-site and reused or recycled. Also, require construction-waste management plans for large projects.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

RC 3

Use Recycled Aggregate in Concrete

Issue:
Waste concrete, asphalt, and glass can be reused as bedding material or as aggregate in new concrete, reducing construction waste and the need for virgin materials.

Recommendation:
Require a minimum amount of recycled concrete, asphalt, or glass as bedding material and within new concrete.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

RC 2

Provide Recycling Areas in Apartment Buildings

Issue:
In many buildings, the lack of a dedicated recycling space impedes recycling.

Recommendation:
Require new multi-family residential buildings to provide adequate space to store and sort recyclable materials.

Benefits

N/A Savings

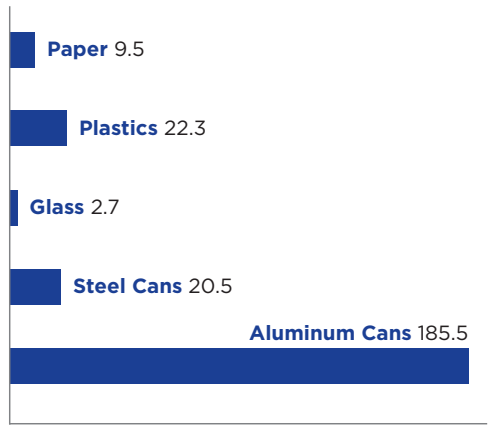
Health & Safety

Environment

Costs

Cost

RC 2: **ENERGY SAVINGS PER TON RECYCLED**



RC 4

Use Recycled Asphalt

Issue:
Asphalt pavement diverted from the construction waste stream can be reused as aggregate in new asphalt, greatly reducing construction waste and the need for virgin materials.

Recommendation:
Require a minimum amount of recycled asphalt as the base material for new asphalt aggregate.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

RC 5

Protect Forests by Using Sustainable Wood

Issue:
Forests store carbon, and tropical forests provide a habitat for half of the world's animal and plant species. Conventional forestry practices degrade forests and are unsustainable.

Recommendation:
Require that a portion of wood used in construction be sustainably harvested or come from reclaimed sources. Require that all tropical wood used in construction be sustainably harvested.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

Sustaining Forests.

Healthy forests store and sequester carbon, and our tropical forests provide habitat for half of the world's plant and animal species. Deforestation releases enormous amounts of carbon dioxide into the atmosphere, 20% of the world total. Conventional forestry practices cause water and air pollution, soil erosion, stream sedimentation and habitat destruction on a massive scale. Sustainable forestry practices mitigate many of these impacts

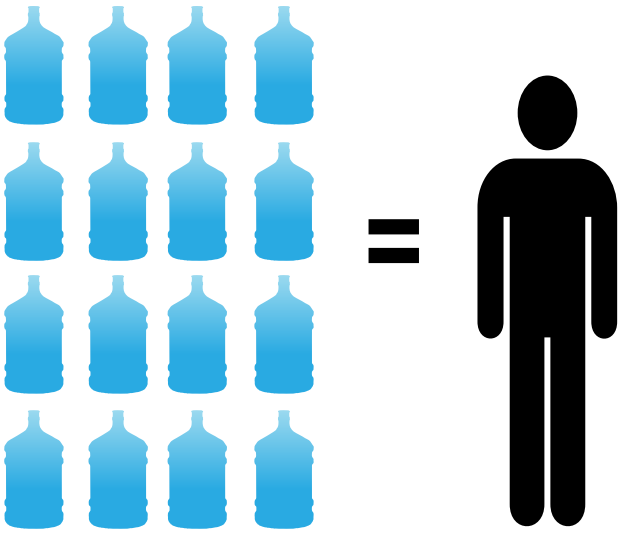
WATER EFFICIENCY

In the last 45 years, New York City has experienced seven droughts, two of which lasted longer than a year.1 Droughts are likely to become even more frequent in the future. According to the New York City Panel on Climate Change, drought frequency will double by 2050 and increase five-fold toward the end of the century.2 In addition, the Delaware Aqueduct, which supplies half of New York City's drinking water, contains a major leak that needs to be repaired. Conserving water is a proactive means to ensure that the City can survive disruptions to its water supply, whether from climate change or infrastructure vulnerabilities.

Fortunately, New York City has a history of successful water conservation. In the 1990s, the city's Department of Environmental Protection metered residential properties, instituted a toilet-rebate program and fixed leaks in the supply system. Thanks to these efforts, daily water consumption levels in the city fell from an average high of 208+ gallons per person in 1988 to approximately 134 gallons per person in 2006.3

Water consumption can be further reduced significantly because many existing practices and plumbing fixtures are surprisingly wasteful. For example, the average New Yorker still uses the equivalent of 16 water-cooler bottles in their home each day. Some commercial tenants air condition their space by running vast amounts of clean (and cold) drinking water through pipes and then dumping it into the sewers. Toilets purchased before 1980 can use as much as seven gallons of water per flush, while some of the latest high-efficiency flush toilets use less than 1.28 gallons. Also, some New Yorkers have begun to reuse water by collecting rainwater or filtering and cleaning wastewater; but this has proven challenging due to city regulations.

The recommendations in this chapter aim to help the city's tenants and owners know when they are wasting water. The recommendations would prohibit certain extremely wasteful practices, such as cooling with drinking water. Other recommendations would reduce water consumption by increasing efficiency standards for plumbing fixtures and ensuring upgrades during building renovations. Finally, these recommendations aim to increase the use of rainwater and other recycled water by revising and streamlining the city's rules for water reuse.



WE 1: **New Yorkers use the equivalent of 16 water cooler bottles of water in their homes, everyday.**

WE 1

Enhance Water Efficiency Standards

Issue:
Although New York City receives substantial rainfall, the city is still vulnerable in dry years and has experienced seven droughts in the last 45 years. Fortunately, the need for water can be easily reduced with more-efficient plumbing fixtures.

Recommendation:
Enhance water efficiency standards for plumbing fixtures.

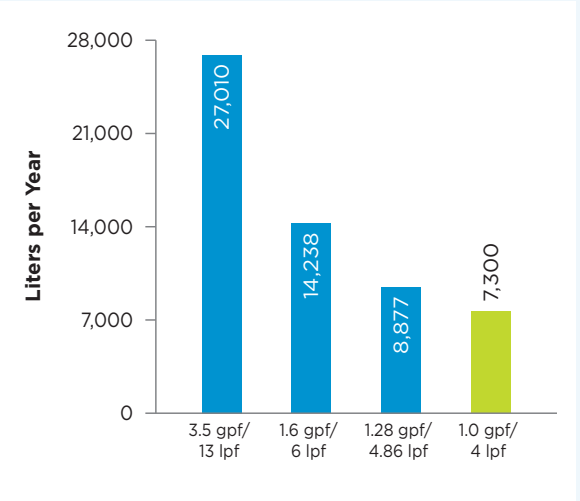
Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

WE 2: **WATER SAVINGS OF EFFICIENT TOILETS**



WE 2

Upgrade Inefficient Toilets, Showerheads & Faucets During Renovations

Issue:
Older toilets and fixtures use three to five times as much water as today's standard fixtures.

Recommendation:
Require the replacement of any outdated plumbing fixtures when bathrooms are renovated.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

WE 3

Catch Leaks by Measuring Water Use

Issue:
Leaks and equipment malfunctions waste a tremendous amount of water in New York City buildings, and they can persist undetected for years. Submeters attached to major water-using equipment can help detect these leaks.

Recommendation:
Require submeters for all major water-using equipment. These submeters will help building managers quickly detect leaks and malfunctions.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

WE 4

Facilitate Use of Recycled Water

Issue:
Using rainwater and recycled water can reduce stress on the city's water supply while simultaneously reducing the volume of combined sewer overflow. But the Plumbing Code currently discourages reuse by limiting applications and requiring all recycled water to follow the same stringent protocols, regardless of end use or incoming water quality.

Recommendation:
Facilitate the use of rainwater and recycled water by tailoring protocols according to incoming water quality and end use, and expand the permitted uses of such water.

Benefits

- N/A Savings
- Health & Safety
- Environment

Costs

- Cost

WE 5

Reduce Use of Drinking Water to Clean Sidewalks

Issue:
Clean drinking water is frequently used in New York City to wash sidewalks, parking lots and streets.

Recommendation:
Require the use of either water-conserving equipment, such as water brooms, or recycled water for cleaning sidewalks, parking lots and streets.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

WE 7

Reuse Water from ConEd Steam

Issue:
The water used by Con Edison to make steam is dumped into the sewers after it has been used by buildings. This wastes 5 million to 10 million gallons of clean water a day and stresses wastewater treatment plants.

Recommendation:
Require buildings that use utility steam for space heating and/or cooling to reuse at least 50% of the steam condensate produced, unless shown to be unfeasible.

Benefits

- Savings
- Health & Safety
- Environment

Costs

- Cost

WE 6

Stop Wasting Drinking Water for Cooling

Issue:
"Once-through" cooling systems emit heat into potable water, which is then drained into the sewer. No other cooling systems wastewater in this manner.

Recommendation:
Prohibit new installations from using "once-through" cooling systems.

Benefits

- N/A Savings
- Health & Safety
- Environment

Costs

- Cost

Once-Through, Then Gone.

Many air conditioning and refrigeration systems around the city pass fresh drinking water through equipment to provide cooling and then dump the water into the City sewer. These systems, which waste enormous amounts of drinking water, are commonly found in use for ice-making machines in hotels and restaurants, for walk-in coolers, older medical equipment and cooling for "back office" portions of buildings where heat loads from people and computers exceed the originally anticipated load for air conditioning. WE 6 looks to prohibit the use of these ubiquitous, wasteful systems.

STORMWATER

The Northeastern U.S. faces a challenge that much of the country only wishes it had: too much water. This excess water, however, does not come in stable forms, such as lakes, but instead in heavy rainfalls that can cause flooding and pollution.

In a more natural setting, this rainwater would be slowed by vegetation, reabsorbed into the soil, returned to the atmosphere by evaporation, and drained into rivers and lakes. But in the city, these natural drainage systems have been largely dismantled. Most of the vegetation has been removed, streams and rivers have been buried, and the ground has been covered by buildings, concrete walkways and asphalt roads, preventing water from ever entering the soil. This has necessitated the creation of engineered storm sewage systems, which channel rainwater through storm drains, sewage pipes and storage tanks. Without such systems, New York's streets and basements would flood on a regular basis.

In general, this engineered storm-drainage system does what it was designed to do. But new issues have arisen that require some rethinking of the system. For example, increased paving in some neighborhoods has led to localized flooding. New possibilities have emerged through site-based systems that recreate or utilize natural hydrological processes. And perhaps most important, increasingly stringent Federal requirements to clean New York Harbor, combined with PlaNYC's goal of opening 90 percent of the city's waterways for active recreation, require that the storm-drainage system do much more to slow the flow of excess rainwater.

Rain storms regularly lead to the pollution of New York Harbor through "combined sewer overflows" (CSOs). These incidents occur because more than half of the city's sewers transport rainwater and wastewater in the same pipes. When the weather is dry, New York's sewage-treatment plants can easily handle the flow. But when heavy rain falls, the rainwater volume can be up to twelve times the wastewater volume, exceeding plant capacity and releasing untreated sewage into the city's rivers. What's more, in some areas of the city, CSOs can be caused by as little as one tenth of an inch of rain. Correcting the CSO problem is therefore much more difficult than preventing localized flooding.

The proposals in this chapter address New York's stormwater issues in two general ways. Current stormwater requirements address only a limited number of larger, newly developed sites, and they place what are now insufficient requirements on even those sites. So first, the new proposals would both broaden this reach by including smaller sites, existing sites and sidewalks, and improve stringency by lowering the amount of flow permitted from all sites. Second, this chapter proposes a series of studies to broaden the techniques used to detain or retain stormwater. These techniques would include such newer ideas as roof-based detention, landscape-based solutions that recreate the natural cycles, and requirements for maintaining those systems.

SW 1

Reduce Excessive Paving of Sites

Issue:
Due to excess stormwater,27 billion gallons of sewage are released directly into New York harbor each year. Paving over the ground exacerbates this problem.

Recommendation:
In new construction projects, require that half of the non-built lot be permeable.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

SW 2

Reduce Stormwater Runoff From New Developments

Issue:
While wastewater discharged by the city into New York Harbor must meet increasingly stringent national and state standards, the city's own stormwater detention standards have not changed in 25 years. For this reason, DEP is considering increasing detention standards for properties with new or altered sewer connections.

Recommendation:
The Task Force supports more rigorous standards for new and altered sewer connections, which should be accompanied by model detention system designs that would meet these standards. Future permit applications and decisions should also be made publicly available. DEP began considering these measures through a process that was independent of the Task Force, prior to the issuance of this report.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

SW 3

Reduce Stormwater Runoff from Construction Sites

Issue:
While state and federal regulations limit stormwater discharge from construction sites that are larger than an acre, smaller sites are unregulated. In New York City, many construction sites are well under an acre.

Recommendation:
Require construction sites of less than an acre to reduce runoff, soil loss, sedimentation, and the generation of dust and particulate matter.

Benefits	Costs
N/A Savings	Cost
Health & Safety	
Environment	

SW 4

Send Rainwater To Waterways

Issue:
Most properties located on the waterfront direct their rainwater into the sewer system, which contributes to more frequent combined sewer overflows during storms.

Recommendation:
Require waterfront properties to treat and discharge rainwater into the adjacent water body, unless it is technically infeasible.

Benefits	Costs
N/A Savings	Cost
Health & Safety	
Environment	

SW 5

Encourage Innovative Stormwater Practices

Issue:
Modern stormwater control systems incorporate both civil engineering strategies, such as underground detention tanks, and landscape-based strategies, such as green roofs and natural landscaping. New York City's regulations, however, do not properly account for the impact of landscape-based strategies.

Recommendation:
Revise stormwater regulations to account for landscape-based strategies.

Benefits	Costs
N/A	N/A

SW 6

Maintain Site-Based Stormwater Detention Systems

Issue:
Site-based stormwater diversion and detention systems must be properly maintained to be a reliable component of the city's storm-water infrastructure.

Recommendation:
Establish maintenance standards for site-based stormwater systems, and require property owners to verify compliance.

Benefits	Costs
N/A Savings	N/A
Health & Safety	
Environment	

SW 5: **The Staten Island "Bluebelt." Stormwater can be controlled with properly engineered natural systems.**

SW 7

Analyze Strategies to Reduce Stormwater Runoff From Existing Developments

Issue:
To reduce combined sewer overflows, New York City must address already developed buildings and lots. These make up nearly 50% of the city's impervious surfaces, and they often release more runoff than permitted, largely due to new paving after initial construction.

Recommendation:
Undertake a study to assess the potential for reducing stormwater runoff from existing properties.

Benefits		Costs
N/A	Savings	N/A
▬	Health & Safety	
○	Environment	

URBAN ECOLOGY

In the past, cities were seen as creations largely divorced from nature. Impermeable concrete replaced dirt roads long ago, skyscrapers rose toward the clouds, and even some backyards were paved over. Nature was confined largely in zoos, the waterfront and parks.

But this image of the "concrete jungle" is an old way of thinking about cities. Increasingly, New Yorkers want nature marbled throughout the city's infrastructure, and it's easy to understand why. Trees don't merely combat the urban heat-island effect, provide shade and reduce stormwater runoff; they also provide evaporative cooling and even filter air pollution. Also, relying on a wide variety of plant and tree species is a powerful way to increase resilience against pests. What's more, New York's native plants tend to be more resistant to drought and disease than others. Many animals, particularly birds, see New York as part of their environment, rather than an isolated area to avoid. In fact, New York is situated along the major East Coast flyway, and the city's parks provide critical stopping grounds for many migratory birds.

In thinking about urban ecology, the Task Force gave particular attention to sidewalks since they represent 8 percent of the city's area and 9 percent of its impermeable (that is, non-water-absorbing) surfaces.1 The proposals in this chapter would encourage the planting of diverse and native trees along the city's sidewalks and other public spaces. Other proposals in this chapter aim to protect trees by both enhancing standards of care during construction activities and creating a program to publicly recognize century-old trees.

UE 1

Increase Biodiversity In Public Landscapes

Issue:
Historically, foreign species and monocultures have been widely used in landscaping to the detriment of the urban ecology. Native and diverse plants species tend to be hardy, require little water and fertilizer, and provide habitats for birds and other native animals.

Recommendation:
Promote diverse and native plant species by requiring their use on city-owned property, including buildings, parks and sidewalks.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

UE 3: **Adding more trees and water-absorbing pavement to sidewalks will make them more pleasant and reduce stormwater runoff.**

UE 2

Increase Biodiversity in Sidewalk Plantings

Issue:
Where groundcover is required under the Zoning Code, such as in sidewalk planting strips, standard practice is to use turfgrass. But turfgrass is a water-intensive monoculture that requires pesticides and fertilizers.

Recommendation:
Prohibit the use of turfgrass within the sidewalk planting strips required in new developments.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

UE 3

Construct Sustainable Sidewalks

Issue:
Sidewalks have the potential to reduce runoff, mitigate the urban heat island effect, promote the use of recycled materials and increase the longevity of trees. However, city rules and regulations for sidewalks are inconsistent and are, in some cases, impediments to green sidewalks

Recommendation:
Create a single consistent sidewalk standard that includes permeable strips, water storage capacity, increased planting and recycled materials.

Benefits

N/A Savings

Health & Safety

Environment

Costs

Cost

UE 4

Preserve "100-Year Old" Trees

Issue:
Large, old trees offer significant benefits to the city by providing cooling, shade, habitat, and carbon sequestration, as well as significant aesthetic benefits.

Recommendation:
Establish a voluntary program whereby property owners can obtain plaques for their "100-year old" trees, which could also be added to a map of significant trees.

Benefits	Costs
N/A Savings	N/A
Health & Safety	
Environment	

UE 5

Protect Street Trees From Construction Activities

Issue:
While sidewalk sheds protect pedestrians during the construction, maintenance and inspection of buildings, they can cause considerable damage to trees. Limbs are often damaged or removed, and the trees are cut off from access to sun and moisture, often resulting in the weakening or even death of the tree.

Recommendation:
During construction, require that street trees be protected and watered, and that any pruning be performed by a professional.

Benefits	Costs
N/A Savings	Cost
Health & Safety	
Environment	

UE 5: **Street trees are an important community resource but are sometimes damaged during construction activity.**

FOOTNOTES

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2 NEW YORK CITY PANEL ON CLIMATE CHANGE, CLIMATE CHANGE RISK INFORMATION, 19 (Feb. 17, 2009), www.nyc.gov/html/om/pdf/2009/NPCC_CRI.pdf

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FINANCIAL COST & SAVINGS METHODOLOGY

Estimating the cost and savings of complying with the Task Force proposals presents a challenge, given the wide variety of building types and construction project scopes in New York City. A particular proposal could, for example, affect the renovation of a single bathroom in a townhouse quite differently than it would impact the construction of a new commercial skyscraper. It was thus necessary to develop a methodology for measuring costs and savings across the range of buildings and construction activities.

To assist the Task Force in estimating costs for proposals, the Mayor's Office of Economic Development (OED) researched methodologies used during code modifications in other cities and in the 2006 NYC Department of Building (DOB) code revision process. The OED selected DOB's methodology, which defined several prototypical buildings in which to assess the impact of code changes on construction costs.

The costing analysis developed by the OED utilized four of DOB's prototypes for new construction, which are a new commercial high-rise, a new residential high-rise, a new residential low-rise; and a new single family house. To evaluate all the Task Force proposals accurately, the OED also found it necessary to add four other prototypes: a new commercial low-rise, a renovation of a large commercial building (equivalent to the new commercial high rise), a renovation/tenant fit-out of a smaller commercial space (equivalent to the low-rise commercial), and a renovated apartment. Most proposals were evaluated in a subset of these eight prototypes, but all prototypes proved useful for some proposals.

The key assumptions used in the costing analysis are:

- Only proposals involving hard or soft construction costs were evaluated in the cost analysis; proposals that recommended studies or administrative processes were not analyzed.
- Costs were assessed according to 2009 prices using recent bids from the Bovis database, adjusted as necessary to account for price escalation.
- Whenever there were a variety of potential compliance paths, it was assumed owners would follow the least expensive path. The cost of a more expensive compliance path was also evaluated if common in New York design or construction practice.
- The analysis of the proposals included all direct costs required for compliance. For example, if changing a mechanical system required additional structural upgrades, those costs were included.
- Only hard construction costs, including related construction markups, were included unless the proposal states that soft costs were also included.
- The cost of each proposal was expressed both in absolute dollars and as a percentage of the overall project cost.

The costing analysis did not incorporate two considerations that would likely have reduced the estimated cost of many proposals. First, future market trends were not considered, although the cost of green code changes should reduce over time. Presently, green products and services represent a niche within the building construction industry, and this is reflected in their pricing. Codifying green practices should make them standard, leading to economies of scale and lower costs.

Second, the analysis did not assess cost reductions that may flow from building design trade-offs. In the Bovis analysis, each decision had to be treated in isolation. By contrast, in an actual design process, increases in the cost of one design element are weighed against potential savings from other design decisions. For example, improvements in the insulation of exterior building walls could permit downsizing of heating and cooling equipment, thus involving both cost increases and decreases. The Bovis cost estimates therefore provide a "worst case" metric.

Members of the Technical Committees calculated annual operational savings for those proposals where savings could be estimated with assurance – namely, the proposals relating to energy efficiency and water efficiency. Savings were analyzed with the same prototypes used for the cost analysis, so that cost and savings figures could be meaningfully compared. Savings from proposals that were difficult to monetize, such as improvements in health and productivity, were not evaluated.

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