

The Green Building Handbook



AN INTRODUCTION TO SUSTAINABLE DESIGN AND CONSTRUCTION



New York City
Economic Development
Corporation

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INTRODUCTION

Non-profits, Fortune 500 companies, and cities across the country are enjoying the environmental, health, and economic benefits of green building. Here in New York City, green buildings are an increasingly common element of the City's skyline, making a lasting impact on the City's future. Local Law 86, known as the "Green Building Law," passed in 2005, requires the use of green building standards in the construction and renovation of certain City-owned and City-funded buildings. Green buildings are also a key component of the recently released *PlaNYC: A Greener Greater New York (PlaNYC)*, the City's long-term, sustainability plan. The momentum behind green building is growing and now is the time for those considering capital projects to understand the opportunities and challenges associated with green construction.

This handbook will serve organizations with wholly or partially City-funded projects that are subject to New York City's Green Building Law. The handbook can also serve as a starting point for anyone interested in green building, particularly those considering a project in New York City. This handbook is not a green design or construction manual; rather it is an overview of green building in general.

The City's long-term sustainability plan, *PlaNYC*, details various initiatives to promote green building.

They include:

- Changes to the City's building code to encourage green design
- Tax credits for solar and green roofs
- Mandates and incentives for energy-efficiency

For more information on *PlaNYC*, go to www.nyc.gov/planyc

IN THIS HANDBOOK YOU WILL FIND:

- ◆ General information on green building, including benefits and costs (p. 3);
- ◆ An overview of the US Green Building Council and the Leadership in Energy and Environmental Design rating system (p. 7);
- ◆ An overview of New York City's Green Building Law (p. 15);
- ◆ Case studies on green building projects in New York City (p. 20);
- ◆ Funding sources and fundraising strategies for green buildings (p. 32);
- ◆ A glossary of commonly used green building terms (p. 35); and
- ◆ Resources for additional information (p. 40).

This handbook was developed by the New York City Economic Development Corporation (NYCEDC), in collaboration with the New York City Department of Cultural Affairs (DCA).

WHAT IS (A) GREEN BUILDING?

While there are a number of ways to define a green building, for the purposes of this handbook the term refers to a structure that is designed, constructed and/or operated in a way that minimizes the environmental impact on its surroundings. At a minimum, green buildings usually include: reduced energy and water consumption; minimization of toxic materials (thereby improving indoor air quality); and increased use of recycled materials.

Multiple green design and construction strategies are employed in green buildings. The following are a sample of such strategies:

1. Maximizing daylight to reduce the need for overhead lights
2. Incorporating energy-efficient lighting and motion sensors
3. Using light colored roofing or roofing with vegetation
4. Minimizing stormwater runoff and reusing captured water on-site
5. Applying water conservation measures such as low-flow plumbing fixtures
6. Utilizing non-toxic materials free of Volatile Organic Compounds (VOC)
7. Purchasing sustainably-harvested wood products¹
8. Including locally produced materials that reduce energy associated with transportation²
9. Developing construction management plans to reduce construction-related waste
10. Generating energy on-site with clean and/or renewable power such as solar, wind or combined heat and power

Since building green can be accomplished in a number of ways, rating systems have emerged to quantify the level of “greenness.” These include the federal ENERGY STAR Buildings Program, Canada’s Green Globes, New York City’s Department of Design and Construction’s High Performance Building Guidelines, and the US Green Building Council’s (USGBC)’s Leadership in Energy and Environmental Design (LEED) rating system. LEED is the most widely used and accepted standard today.³ Since the Green Building Law references LEED as the required standard, this handbook focuses on the USGBC’s rating system.

As early planning is critical to the success of a green building project, green building project teams often kick-start with a charette, an inter-disciplinary brainstorming session, to discuss goals and ideas in order to generate the most holistic and comprehensive approach.

For more information on green building charettes, consult the following guides:

Department of Energy:

http://www.eere.energy.gov/buildings/highperformance/charrette_handbook.html

Kresge Foundation:

<http://www.kresge.org/cms/uploads/HowDoIBuildGreen.pdf>

WHY BUILD GREEN?

While some organizations have legal obligations to build their projects in accordance with green building standards, such as defined in the Green Building Law, there are benefits that could be considered by any development project.⁴

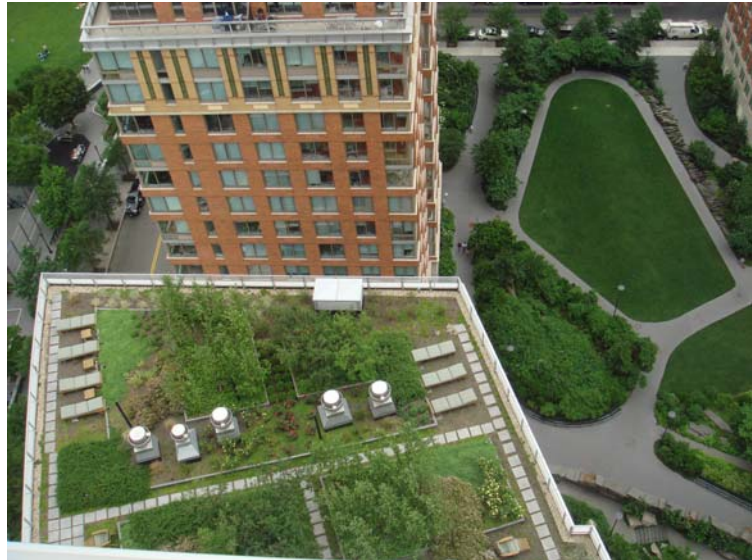
The U.S. Environmental Protection Agency defines the benefits of building green in three major categories:⁵

- **Environmental Benefits:** Green buildings conserve natural resources, protect ecosystems, improve air and water quality, and decrease waste.
- **Economic Benefits:** Green buildings reduce capital and operating costs, increase property values, and boost worker productivity.
- **Health and Community Benefits:** Green buildings improve the health, well-being, and quality of life for occupants as well as the surrounding community. The community also benefits from a reduction in pressures on the local infrastructure and service delivery systems.

One of the most often cited benefits of green building is the reduction in energy costs that stem from energy efficiency measures, which also help reduce greenhouse gases.⁶ While New York City is inherently more energy efficient

than many other American cities because of its dense urban fabric, its significant scale still makes a large impact on the environment. And because car ownership is so low and so much of the City is comprised of built structures, 79% of New York City's greenhouse gas emissions stem from energy consumed in buildings. Incorporating energy efficiency measures will help reduce that impact while saving building owners and occupants money.

Building green can also produce considerable health and economic benefits. A number of articles have noted that tenants of buildings with green features have fewer illness symptoms and higher productivity rates than of those built without such elements.⁷ In New York City, which suffers from high asthma rates and limited open space, clean and healthy indoor space is particularly critical.



A green roof in Battery Park City in Manhattan that helps reduce stormwater runoff.

Green buildings have benefits not just to owners and occupants but to the larger environment as well. For example, project teams can choose products that avoid the depletion of the world's natural resources, such as rapidly renewable materials. By planting vegetation on roofs to minimize stormwater runoff and associated pollution to our waterways, teams can create a positive impact well beyond the footprint of a single building.

THE COST OF BUILDING GREEN

While reduced energy and water use and other measures can create substantial operating savings, there is often an upfront cost to green building that is not found in traditional construction. These costs range from project to project but tend to decrease as a project team gains experience with green building, and can often pay for themselves through operating savings.⁸ In fact, some project teams have found green buildings to cost less than traditional construction due to a more efficient design and construction plan using fewer materials and creating little waste.⁹

Green building may impact both a project's hard and soft costs. Soft costs may increase due to a larger number of consultants needed for a green project. For example, if a project team is set on achieving a 20% reduction in energy use, they may hire a consultant to evaluate a number of energy saving strategies and determine which one is the most cost-effective. If there is an increase in hard costs, it is often due to the materials chosen. With time, the price of special consulting services, materials and mechanical systems used in high performance buildings will decrease as the market matures, producing more services and products to meet growing demand. Currently though, some, but certainly not all, green features may cost more.

There is also a cost to obtaining LEED certification. The USGBC charges a fee, based on project size and rating system, to review a project application. In addition, the required documentation can take significant time to prepare and some project teams assign a person whose sole responsibility is to ensure that all the LEED documentation is in order and submitted in a timely fashion.

One key method to control costs is to integrate green design from project inception, limiting costs associated with design changes.

The following are some studies on the costs associated with green building:

Resource Guide for Sustainable Development in an Urban Environment

www.usgbc.org/Docs/Resources?SLU_Final_10-22-02.pdf

Costing Green: A Comprehensive Database

www.davislangdon.com/USA/Research/ResearchFinder/2004-Costing-Green-A-Comprehensive-Cost-Database-and-Budgeting-Methodology/

Green Building and the Bottom Line

www.bdcnetwork.com/contents/pdfs/whitepaper06.pdf

THE US GREEN BUILDING COUNCIL AND LEED

The USGBC is a national, non-profit organization which developed the LEED rating system through consensus reached by its membership, comprised largely of architects and construction professionals. Through LEED, the USGBC promotes a comprehensive approach to sustainability by incorporating five key areas of human and environmental health into the rating system: sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality. The LEED standards also encourage innovative and exemplary design.

There are five LEED rating systems, each tailored for different project types. As of the writing of this guide, the rating systems include:¹⁰

- ◆ LEED for New Construction and Major Renovations (LEED-NC) version 2.2, for new construction and gut renovations
- ◆ LEED for Existing Buildings version 2.0, for projects aiming to improve the long-term operating and maintenance of a building
- ◆ LEED for Commercial Interiors version 2.0, for projects that have limited control over shared building systems

- ◆ LEED for Core and Shell version 2.0, for projects that are not responsible for tenant fit-out
- ◆ LEED for Schools, for educational facilities

The following three rating systems are under pilot review:

- LEED for Neighborhood Development
- LEED for Homes
- LEED for Retail

All LEED rating systems are similarly designed. Each has a number of prerequisites that projects must meet in order to be considered for certification. LEED assigns points for various green strategies; the more points earned, the higher certification level achieved. All LEED rating systems have the same levels—Certified, Silver, Gold and Platinum—but require different point totals to earn them.

Each rating system includes a checklist to assist project teams assess various strategies they can employ to achieve LEED certification. The LEED checklists and rating systems offer a roadmap for building green but each project team will have to determine the most appropriate and cost-effective strategies for their particular project.

LEED LINGO

Only buildings can be LEED Certified. Professionals are LEED Accredited (LEED AP). If you have a LEED AP on your design team, you can get a point for your project. Any individual can sign up to take the LEED AP exam.

Some of these strategies may include:

- Site planning that minimizes environmental impacts
- Recycled gray water systems
- Reused building materials

- Higher insulating windows
- Low-toxicity paints
- biodegradable carpet

Checklists for LEED for New Construction, Existing Buildings and Commercial Interiors are included in the handbook. For more information on the various rating systems and to download these checklists, go to www.usgbc.org.

LEED CHECKLISTS

LEED for New Construction Version 2.2

Certified: 26-32 points Silver: 33-38 points Gold: 39-51 points Platinum: 52-69 points

Sustainable Sites		14 Possible Points
Prereq 1	Construction Activity Pollution Prevention	Required
Credit 1	Site Selection	1
Credit 2	Development Density & Community Connectivity	1
Credit 3	Brownfield Redevelopment	1
Credit 4.1	Alternative Transportation, Public Transportation Access	1
Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
Credit 5.1	Site Development, Protect or Restore Habitat	1
Credit 5.2	Site Development, Maximize Open Space	1
Credit 6.1	Stormwater Design, Quantity Control	1
Credit 6.2	Stormwater Design, Quality Control	1
Credit 7.1	Heat Island Effect, Non-Roof	1
Credit 7.2	Heat Island Effect, Roof	1
Credit 8	Light Pollution Reduction	1
Water Efficiency		5 Possible Points
Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1
Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
Credit 2	Innovative Wastewater Technologies	1
Credit 3.1	Water Use Reduction, 20% Reduction	1
Credit 3.2	Water Use Reduction, 30% Reduction	1
Energy & Atmosphere		17 Possible Points
Prereq 1	Fundamental Commissioning of Building Energy Systems	Required
Prereq 2	Minimum Energy Performance	Required
Prereq 3	Fundamental Refrigerant Management	Required
Credit 1	Optimize Energy Performance	1-10
Credit 2	On-Site Renewable Energy	1-3
Credit 3	Enhanced Commissioning	1
Credit 4	Enhanced Refrigerant Management	1
Credit 5	Measurement & Verification	1
Credit 6	Green Power	1
Materials & Resources		13 Possible Points
Prereq 1	Storage & Collection of Recyclables	Required
Credit 1.1	Building Reuse, Maintain 75% of Existing Walls, Floors & Roof	1

Credit 1.2	Building Reuse, Maintain 95% of Existing Walls, Floors & Roof	1
Credit 1.3	Building Reuse, Maintain 50% of Interior Non-Structural Elements	1
Credit 2.1	Construction Waste Management, Divert 50% from Disposal	1
Credit 2.2	Construction Waste Management, Divert 75% from Disposal	1
Credit 3.1	Materials Reuse, 5%	1
Credit 3.2	Materials Reuse, 10%	1
Credit 4.1	Recycled Content, 10% (post-consumer + 1/2 pre-consumer)	1
Credit 4.2	Recycled Content, 20% (post-consumer + 1/2 pre-consumer)	1
Credit 5.1	Regional Materials, 10% Extracted, Processed & Manufactured Regionally	1
Credit 5.2	Regional Materials, 20% Extracted, Processed & Manufactured Regionally	1
Credit 6	Rapidly Renewable Materials	1
Credit 7	Certified Wood	1

Indoor Environmental Quality	15 Possible Points
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Prereq 1	Minimum IAQ Performance	Required
Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required
Credit 1	Outdoor Air Delivery Monitoring	1
Credit 2	Increased Ventilation	1
Credit 3.1	Construction IAQ Management Plan, During Construction	1
Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1
Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1
Credit 4.2	Low-Emitting Materials, Paints & Coatings	1
Credit 4.3	Low-Emitting Materials, Carpet Systems	1
Credit 4.4	Low-Emitting Materials, Composite Wood & Agrifiber Products	1
Credit 5	Indoor Chemical & Pollutant Source Control	1
Credit 6.1	Controllability of Systems, Lighting	1
Credit 6.2	Controllability of Systems, Thermal Comfort	1
Credit 7.1	Thermal Comfort, Design	1
Credit 7.2	Thermal Comfort, Verification	1
Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1
Credit 8.2	Daylight & Views, Views for 90% of Spaces	1

Innovation & Design Process	5 Possible Points
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Credit 1.1	Innovation in Design	1
Credit 1.2	Innovation in Design	1
Credit 1.3	Innovation in Design	1
Credit 1.4	Innovation in Design	1
Credit 2	LEED Accredited Professional	1

Project Totals	69 Possible Points
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LEED for Existing Buildings Version 2.0

Certified: 32-39 points Silver: 40-47 points Gold: 48-63 points Platinum: 64-85 points

Sustainable Sites	14 Possible Points
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Prereq 1	Erosion & Sedimentation Control	Required
Prereq 2	Age of Building	Required
Credit 1.1	Plan for Green Site & Building Exterior Management, 4 actions	1
Credit 1.2	Plan for Green Site & Building Exterior Management, 8 actions	1
Credit 2	High Development Density Building & Area	1
Credit 3.1	Alternative Transportation, Public Transportation Access	1
Credit 3.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1

Credit 3.3	Alternative Transportation, Alternative Fuel Vehicles	1
Credit 3.4	Alternative Transportation, Car Pooling & Telecommuting	1
Credit 4.1	Reduced Site Disturbance, Protect or Restore Open Space (50%)	1
Credit 4.2	Reduced Site Disturbance, Protect or Restore Open Space (75%)	1
Credit 5.1	Stormwater Management, 25% Rate & Quantity Reduction	1
Credit 5.2	Stormwater Management, 50% Rate & Quantity Reduction	1
Credit 6.1	Heat Island Reduction, Non-Roof	1
Credit 6.2	Heat Island Reduction, Roof	1
Credit 7	Light Pollution Reduction	1

Water Efficiency	5 Possible Points
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Prereq 1	Minimum Water Efficiency	Required
Prereq 2	Discharge Water Compliance	Required
Credit 1.1	Water Efficient Landscaping, Reduce Potable Water Use by 50%	1
Credit 1.2	Water Efficient Landscaping, Reduce Potable Water Use by 95%	1
Credit 2	Innovative Wastewater Technologies	1
Credit 3.1	Water Use Reduction, 10% Reduction	1
Credit 3.2	Water Use Reduction, 20% Reduction	1

Energy & Atmosphere	23 Possible Points
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Prereq 1	Existing Building Commissioning	Required
Prereq 2	Minimum Energy Performance, Energy Star 60	Required
Prereq 3	Ozone Protection	Required
Credit 1.1	Optimize Energy Performance, Energy Star 63	1
Credit 1.2	Optimize Energy Performance, Energy Star 67	1
Credit 1.3	Optimize Energy Performance, Energy Star 71	1
Credit 1.4	Optimize Energy Performance, Energy Star 75	1
Credit 1.5	Optimize Energy Performance, Energy Star 79	1
Credit 1.6	Optimize Energy Performance, Energy Star 83	1
Credit 1.7	Optimize Energy Performance, Energy Star 87	1
Credit 1.8	Optimize Energy Performance, Energy Star 91	1
Credit 1.9	Optimize Energy Performance, Energy Star 95	1
Credit 1.10	Optimize Energy Performance, Energy Star 99	1
Credit 2.1	Renewable Energy, On-Site 3%/Off-Site 15%	1
Credit 2.2	Renewable Energy, On-Site 6%/Off-Site 30%	1
Credit 2.3	Renewable Energy, On-Site 9%/Off-Site 45%	1
Credit 2.4	Renewable Energy, On-Site 12%/Off-Site 60%	1
Credit 3.1	Building Operation & Maintenance, Staff Education	1
Credit 3.2	Building Operation & Maintenance, Building Systems Maintenance	1
Credit 3.3	Building Operation & Maintenance, Building Systems Monitoring	1
Credit 4	Additional Ozone Protection	1
Credit 5.1	Performance Measurement, Enhanced Metering (4 actions)	1
Credit 5.2	Performance Measurement, Enhanced Metering (8 actions)	1
Credit 5.3	Performance Measurement, Enhanced Metering (12 actions)	1
Credit 6	Documenting Sustainable Building Cost Impacts	1

Materials & Resources	16 Possible Points
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Prereq 1.1	Source Reduction & Waste Management, Waste Stream Audit	Required
Prereq 1.2	Source Reduction & Waste Management, Storage & Collection	Required
Prereq 2	Toxic Material Source Reduction, Reduced Mercury in Light Bulbs	Required
Credit 1.1	Construction, Demolition & Renovation Waste Management, Divert 50%	1
Credit 1.2	Construction, Demolition & Renovation Waste Management, Divert 75%	1
Credit 2.1	Optimize Use of Alternative Materials, 10% of Total Purchases	1
Credit 2.2	Optimize Use of Alternative Materials, 20% of Total Purchases	1

Credit 2.3	Optimize Use of Alternative Materials, 30% of Total Purchases	1
Credit 2.4	Optimize Use of Alternative Materials, 40% of Total Purchases	1
Credit 2.5	Optimize Use of Alternative Materials, 50% of Total Purchases	1
Credit 3.1	Optimize Use of IAQ Compliant Products, 45% of Annual Purchases	1
Credit 3.2	Optimize Use of IAQ Compliant Products, 90% of Annual Purchases	1
Credit 4.1	Sustainable Cleaning Products & Materials, 30% of Annual Purchases	1
Credit 4.2	Sustainable Cleaning Products & Materials, 60% of Annual Purchases	1
Credit 4.3	Sustainable Cleaning Products & Materials, 90% of Annual Purchases	1
Credit 5.1	Occupant Recycling, Recycle 30% of Total Waste Stream	1
Credit 5.2	Occupant Recycling, Recycle 40% of Total Waste Stream	1
Credit 5.3	Occupant Recycling, Recycle 50% of Total Waste Stream	1
Credit 6	Additional Toxic Material Source Reduction, Reduced Mercury in Light Bulbs	1

Indoor Environmental Quality	22 Possible Points
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Prereq 1	Outside Air Introduction & Exhaust System	Required
Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required
Prereq 3	Asbestos Removal or Encapsulation	Required
Prereq 4	PCB Removal	Required
Credit 1	Outside Air Delivery Monitoring	1
Credit 2	Increased Ventilation	1
Credit 3	Construction IAQ Management Plan	1
Credit 4.1	Documenting Productivity Impacts, Absenteeism & Healthcare Cost Impacts	1
Credit 4.2	Documenting Productivity Impacts, Other Productivity Impacts	1
Credit 5.1	Indoor Chemical & Pollutant Source Control, Reduce Particulates in Air System	1
Credit 5	Indoor Chemical & Pollutant Source Control, Isolation of High Volume Copy/Print/Fax Room	1
Credit 6.1	Controllability of Systems, Lighting	1
Credit 6.2	Controllability of Systems, Temperature & Ventilation	1
Credit 7.1	Thermal Comfort, Compliance	1
Credit 7.2	Thermal Comfort, Permanent Monitoring System	1
Credit 8.1	Daylight & Views, Daylight 50% of Spaces	1
Credit 8.2	Daylight & Views, Daylight for 75% of Spaces	1
Credit 8.3	Daylight & Views, Views for 45% of Spaces	1
Credit 8.4	Daylight & Views, Views for 90% of Spaces	1
Credit 9	Contemporary IAQ Practices	1
Credit 10.1	Green Cleaning, Entryway Systems	1
Credit 10.2	Green Cleaning, Isolation of Janitorial Closets	1
Credit 10.3	Green Cleaning, Low Environmental Impact Cleaning Policy	1
Credit 10.4	Green Cleaning, Low Environmental Impact Pest Management Policy	1
Credit 10.5	Green Cleaning, Low Environmental Impact Pest Management Policy	1
Credit 10.6	Green Cleaning, Low Environmental Impact Cleaning Equipment Policy	1

Innovation & Design Process	5 Possible Points
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Credit 1.1	Innovation in Upgrades, Operation & Maintenance	1
Credit 1.2	Innovation in Upgrades, Operation & Maintenance	1
Credit 1.3	Innovation in Upgrades, Operation & Maintenance	1
Credit 1.4	Innovation in Upgrades, Operation & Maintenance	1
Credit 2	LEED Accredited Professional	1

Project Totals	85 Possible Points
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LEED for Commercial Interiors Version 2.0

Certified: 21-26 points Silver: 27-31 points Gold: 32-41 points Platinum: 42-57 points

Sustainable Sites		7 Possible Points
Credit 1	Site Selection, LEED Certified Building or Specific Characteristics	3
Credit 2	Development Density & Community Connectivity	1
Credit 3.1	Alternative Transportation, Public Transportation Access	1
Credit 3.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
Credit 3.3	Alternative Transportation, Parking Availability	1
Water Efficiency		2 Possible Points
Credit 1.1	Water Use Reduction, 20% Reduction	1
Credit 1.2	Water Use Reduction, 30% Reduction	1
Energy & Atmosphere		12 Possible Points
Prereq 1	Fundamental Commissioning	Required
Prereq 2	Minimum Energy Performance	Required
Prereq 3	CFC Reduction in HVAC&R Equipment	Required
Credit 1.1	Optimize Energy Performance, Lighting Power	1
Credit 1.2	Optimize Energy Performance, Lighting Controls	1
Credit 1.3	Optimize Energy Performance, HVAC	1
Credit 1.4	Optimize Energy Performance, Equipment & Appliances	2
Credit 2	Enhanced Commissioning	1
Credit 3	Energy Use, Measurement & Payment Accountability	2
Credit 4	Green Power	1
Materials & Resources		14 Possible Points
Prereq 1	Storage & Collection of Recyclables	Required
Credit 1.1	Tenant Space, Long Term Commitment	1
Credit 1.2	Building Reuse, Maintain 40% of Interior Non-Structural Components	1
Credit 1.3	Building Reuse, Maintain 60% of Interior Non-Structural Components	1
Credit 2.1	Construction Waste Management, Divert 50% from Landfill	1
Credit 2.2	Construction Waste Management, Divert 75% from Landfill	1
Credit 3.1	Resource Reuse, 5%	1
Credit 3.2	Resource Reuse, 10%	1
Credit 3.3	Resource Reuse, 30% Furniture & Furnishings	1
Credit 4.1	Recycled Content, 10% (post-consumer + 1/2 pre-consumer)	1
Credit 4.2	Recycled Content, 20% (post-consumer + 1/2 pre-consumer)	1
Credit 5.1	Regional Materials, 20% Manufactured Regionally	1
Credit 5.2	Regional Materials, 10% Extracted & Manufactured Regionally	1
Credit 6	Rapidly Renewable Materials	1
Credit 7	Certified Wood	1
Indoor Environmental Quality		17 Possible Points
Prereq 1	Minimum IAQ Performance	Required
Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required
Credit 1	Outdoor Air Delivery Monitoring	1
Credit 2	Increased Ventilation	1
Credit 3.1	Construction IAQ Management Plan, During Construction	1
Credit 3.2	Construction IAQ Management Plan, Before Occupancy	1
Credit 4.1	Low-Emitting Materials, Adhesives & Sealants	1
Credit 4.2	Low-Emitting Materials, Paints & Coatings	1
Credit 4.3	Low-Emitting Materials, Carpet Systems	1
Credit 4.4	Low-Emitting Materials, Composite Wood & Laminate Adhesives	1

Credit 4.5	Low-Emitting Materials, Systems Furniture & Sealing	1
Credit 5	Indoor Chemical & Pollutant Source Control	1
Credit 6.1	Controllability of Systems, Lighting	1
Credit 6.2	Controllability of Systems, Temperature & Ventilation	1
Credit 7.1	Thermal Comfort, Compliance	1
Credit 7.2	Thermal Comfort, Monitoring	1
Credit 8.1	Daylight & Views, Daylight 75% of Spaces	1
Credit 8.2	Daylight & Views, Daylight 90% of Spaces	1
Credit 8.3	Daylight & Views, Views for 90% of Seated Spaces	1
Innovation & Design Process		5 Possible Points
Credit 1.1	Innovation in Upgrades, Operation & Maintenance	1
Credit 1.2	Innovation in Upgrades, Operation & Maintenance	1
Credit 1.3	Innovation in Upgrades, Operation & Maintenance	1
Credit 1.4	Innovation in Upgrades, Operation & Maintenance	1
Credit 2	LEED Accredited Professional	1
Project Totals		57 Possible Points

NEW YORK CITY'S GREEN BUILDING LAW

Local Law 86

Disclaimer: The information provided herein is advisory in nature. Please refer to Local Law 86 (2005) and Chapter 10 of Title 43 of the Rules of the City of New York for exact legal requirements.

Local Law 86, also known as the Green Building Law, was passed in December 2005 and became effective on January 1, 2007. The law recognizes the significant impact that building construction has on the urban environment and that there are benefits to designing and constructing buildings in a way that minimizes the use of energy, water and other natural resources. Not all projects are subject to the Green Building Law, but those that are within the law's purview, such as certain City-funded construction and renovation projects, are required to meet certain green building guidelines.

The following overview is meant to provide a summary of the law's applicability and requirements. Please refer to the following regulatory documents for definitions and statutory provisions available on the New York City Office of Environmental Coordination's website at: www.nyc.gov/html/oec/html/sustain/ll86.shtml.

- Local Law 86 of 2005, which amended the New York City Charter in relation to green building standards; and
- Chapter 10 of Title 43 of the Rules of the City of New York, which contains mayoral rules governing green building standards.

Project characteristics, occupancy group, construction costs and City-capital contributions determine the specific requirements for green construction, energy cost reduction and water conservation under the Green Building Law.

To determine if Local Law 86 may apply to your project ask yourself the following three questions. It is also a good idea to talk to your project manager to see if the law applies to your project.

For capital projects of entities that are not City agencies

1. Is the capital project receiving \$10 million or more OR at least 50% of the total estimated project cost (this includes land acquisition, design, construction, etc.) from the City's Capital Budget (this also includes State and Federal funding passing through the City's budget)?

*If you answered YES to the question above, continue.
If NO, your project may not trigger the law.*

2. Is the capital project classified as any of the following occupancy groups:

B-1: Storage	B-2: Storage	C: Mercantile	E: Business
F1-a: Assembly	F1-b: Assembly	F-3: Assembly	F-3: Assembly
G: Educational	H-1: Institutional	H-2: Institutional	

For assistance in determining the occupancy code for your project, please refer to Title 27, Subchapter 3 of the Building Code regulations at:
http://www.nyc.gov/html/dob/html/reference/code_internet.shtml

*If you answered YES to the question above, continue.
If NO, your project may not trigger the law.*

3. Do the capital project's construction costs meet the following criteria?

- a. For new buildings, additions or substantial reconstructions (including fit-outs of condominium units and leased space):
 - i. costs of \$2 million or more
- b. For other projects involving the installation or replacement of specific systems in a building:
 - i. Plumbing systems costing \$500,000 or more
 - ii. Boilers costing \$2 Million or more
 - iii. Lighting systems costing \$1 Million or more
 - iv. HVAC comfort controls costing \$2 Million or more

*If you answered YES to the question above, check the requirement chart to determine which green building standards your project must meet.
If NO, your project may not trigger the law.*

Capital projects of City agencies need only follow questions 2 and 3 above.

LOCAL LAW 86 GREEN BUILDING REQUIREMENTS

This chart is a summary of requirements--reference the full law and the Mayoral rules for more detail.¹¹

	LEED Certified*	LEED Silver*	5% Energy Savings^	10% Energy Savings^	20% Energy Savings^	25% Energy Savings^	30% Water Savings+
New Buildings, Additions, and Substantial Reconstructions							
Capital Project Construction Costs between \$2 Million and less than \$12 Million							
Occupancy Codes: B-1, B-2, C, E, F1-a, F1-b, F-3, F-4, H-1		X					
Occupancy Codes G, H-2	X						X
Capital Project Construction Costs of \$12 Million or more							
Occupancy Code: G	X				X		
Capital Project Construction Costs between \$12 Million and less than \$30 Million							
Occupancy Codes: B-1, B-2, C, E, F1-a, F1-b, F-3, F-4, H-1		X			X		
Occupancy Code: H-2	X				X		
Capital Project Construction Costs of \$30 Million or more							
Occupancy Codes: B-1, B-2, C, E, F1-a, F1-b, F-3, F-4, H-1, H-2		X				X	
Occupancy Code: H-2	X					X	
Any of above that includes the installation or replacement of a plumbing system with construction costs of \$500,000 or more							X
Other Capital Projects Involving the Installation or Replacement of Specific Systems in a Building							
Occupancy Codes: B-1, B-2, C, E, F1-a, F1-b, F-3, F-4, G, H-1, H-2							
Installation/Replacement of Plumbing System with a construction cost of \$500,000 or More							X
Installation/Replacement of Boilers, with a construction cost of \$2 Million or More				X			
Installation/Replacement of Lighting Systems with a construction cost of \$1 Million or More				X			
Installation/Replacement of HVAC Comfort Controls with a construction cost of \$2 Million or More			X				

* LEED level required for LEED rating system most appropriate under USGBC guidelines: New Construction Version 2.2, Existing Buildings Version 2.0 or Commercial Interiors Version 2.0

^ Energy savings are calculated using methodology prescribed under LEED Energy & Atmosphere Credit 1 of LEED for New Construction Version 2.1 or the NYS Energy Conservation Construction Code, whichever is more stringent. Additional cost savings are required if paybacks can be achieved in 7 years.

+ Water savings are calculated using a methodology not less stringent than that prescribed under LEED Water Efficiency Credit 3.2 of LEED for New Construction Version 2.1 or 2.2. If the NYC Department of Buildings rejects an application for waterless urinals, this requirement is reduced to 20% savings.

Local Law 86 and LEED

Local Law 86 references the US Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) rating system as its green building standard. As already mentioned, there are multiple LEED rating systems tailored for different types of projects.

The Mayoral rules governing green building standards specify the following three LEED rating systems:

- [LEED for New Construction and Major Renovations \(LEED-NC\) Version 2.2](#)
- [LEED for Existing Buildings \(LEED-EB\) Version 2.0](#)
- [LEED for Commercial Interiors \(LEED-CI\) Version 2.0](#)

While there is overlap among the three rating systems, the project scope and control over shared building systems will help determine which rating system is most appropriate. For more information on these rating systems, see section above entitled, "The US Green Building Council and LEED."

Complying With Local Law 86 for Certain Projects Funded Through NYCEDC

[Restrictions on Certain LEED Credits](#)

For projects governed by state contracting law, there are restrictions on specifying certain items (such as regional materials or certified wood) that could be used to obtain LEED credits for Local Law 86 projects. To determine if your project is subject to these restrictions, please contact your NYCEDC or DCA project manager.

[LEED Certification](#)

To ensure compliance with Local Law 86, NYCEDC recommends that all projects required to meet LEED Certified or LEED Silver apply and obtain certification

from the USGBC. Registration is the first step in the LEED certification process. Groups are encouraged to register their projects as early as possible to gain additional resources from the USGBC. For more information about project certification, including forms and fees, please go to: www.usgbc.org, click on “LEED” and then “Register Your Project.”

Local Law 86 Reporting

Local Law 86 requires reporting on the green design elements included in a project. Groups will receive a Local Law 86 Reporting Worksheet from either their assigned NYCEDC project manager or other designated NYCEDC staff to be filled out by the architect or project team member responsible for LEED requirements. This form will be submitted to your NYCEDC project manager or other NYCEDC designated staff person at three phases: after receipt of Certificate to Proceed, after final design and after substantial construction.

CASE STUDIES

In this section you will find project profiles from three New York City-based non-profits that voluntarily opted to build green. These projects were selected to highlight key aspects of the evaluation and implementation of green design and construction strategies. Each case study is based on information provided by the project team and includes a “lessons learned” section that may be instructive to groups considering green design for the first time.

NEW YORK THEATRE WORKSHOP

PROJECT TEAM:

Role

Project Lead
Architect, Energy Consultant,
& LEED Accredited Consultant
General Contractor

Firm

New York Theatre Workshop
Mitchell Kurtz Architect PC
TBD

ADDRESS:

72 E. 4th Street, Manhattan

LEED RATING:

Designed to meet LEED-NC Gold

START DATE:

Fall 2001 (start of design)

END DATE:

July 2009

TOTAL AREA:

5,100 square feet

TOTAL COST:

\$3 Million

Organizational Background

For 25 years, New York Theatre Workshop (NYTW) has provided a home for innovative theater artists. With the purchase of a new facility, NYTW decided to build green, appealing to the organization’s mission and their commitment to forward-looking and community-minded work. This project will result in New York City’s first certified green urban industrial building.

In October 2005, NYTW purchased the vacant building at 72 E. 4th Street from the NYC Department of Housing Preservation and Development. The new facility is located across the street from the site of their principle theater of 15

years. This existing one-story building will be expanded to two-stories and renovated to provide construction facilities for scenery, costumes, and props for NYTW productions.

NYTW's primary design goal for the renovation of this building is to provide workshops to fabricate their production scenery and to optimize the comfort and health benefits of their employees and artists. Working with their architect, NYTW realized that this goal required the incorporation of many green design elements, and so chose to design towards a LEED Gold standard. After planning the building, they are also looking into



green practices for the continued maintenance and operations of the facility and their current theater, ranging from cleaning materials to waste disposal techniques for scenery no longer needed after a show closes.

Rendering of the New York Theatre Workshop building

Green Highlights

With the completion of the construction process, NYTW will have taken measures to minimize sound, noise, and air pollution and dramatically cut waste generation and emissions. Building systems will use a minimum of material and energy resources in its construction and operation and by reusing the existing building walls, floors and foundations, will maximize the amount of construction waste diverted from landfills. Very low-flow water saving plumbing fixtures, dual flush toilets, and auto shut-off faucets will conserve water. Users will have control of multiple levels of lighting in order to manage visual comfort, color matching,

and energy consumption. Mechanical equipment will use refrigerants that minimize potential for ozone depletion and global warming. Building system controls, including occupancy sensors that control lighting and modulate the air handlers and fresh air intake, will effectively manage mechanical and electrical systems, maximizing comfort while minimizing energy consumption. Manufactured materials with recycled content will be used as well as the exclusive use of wood produced from sustainably harvested forests. Light bulbs with low levels of mercury will reduce the amount of mercury consumption and, thus, the amount entering the waste stream at the end of the bulb's life.

“Start thinking green from the start. Focus design team energies on achievable results that really boost energy conservation; investment in those areas continues to pay environmental and economic benefits year after year. “

-Mitchell Kurtz, Architect

In anticipating the dusts and odors that will be produced in the course of the work in the shop, NYTW considered the importance of a healthy indoor air environment. Increased fresh air ventilation and filtration will provide abundant clean air and remove pollutants while heat recovery will reclaim the energy of exhausted air. Rooms generating contaminants will be separated from others and materials such as paint, carpet, adhesives, sealants, and composite wood products will have low levels of Volatile Organic Compounds (VOCs) and no urea formaldehyde, contributing to a healthy indoor air environment.

Furthermore, NYTW will reduce the amount of energy consumed by reusing materials and donating sets, costumes, and props to ensure few resources are

wasted. For example, sets that have traditionally been constructed of wood, will now be made primarily of recycled steel, which will again be recycled after the production. Finally, NYTW will recycle or reuse 100% of all eligible materials used in their offices.

Lessons Learned

Initial goal-setting developed into green design because one of the primary design concerns of this industrial facility was the health of the workers in the building. The NYTW team was already thinking about fresh air, the best lighting, and excellent ventilation. As their architect began designing these systems, he encouraged the team to design even “greener” and meet the LEED Gold standard.

Incorporation of green elements began later in the design process, and therefore there were lost opportunities to access funds from foundations and granting agencies. For most of the funding opportunities, NYTW was ineligible because the project was too far along. In fact, NYTW did not receive any green-specific financing or funding for this project. While this project is small in terms of construction projects, it is large compared to the organization’s size. Nonetheless, the increased cost of green design and construction was small enough (approximately 10% of the total project cost) that NYTW could absorb the change. Had NYTW considered green building from project inception more time and funds would have been available to the organization.

BROOKLYN CENTER FOR THE URBAN ENVIRONMENT

PROJECT TEAM:

Role

Project Lead
Architect
Energy Consultant
LEED Accredited Consultant
General Contractor

Firm

Brooklyn Center for the Urban Environment
AF Architects, Thread Collective
EME Group
Lauren Gropper
Nativo

ADDRESS:

168 7th Street, Brooklyn

LEED RATING:

Designed to meet LEED-CI Gold

START DATE:

Winter 2001 (start of space search)

END DATE:

Fall 2007

TOTAL AREA:

20,000 square feet

TOTAL COST:

\$3.5 Million

Organizational Background

For over 25 years, Brooklyn Center for the Urban Environment (the Center) has delivered contextualized learning opportunities on the subject of the built and natural environment to students residing in all five boroughs of New York City.

When the time came to relocate its headquarters, the Center naturally wanted to engage in the green building process and chose to rehabilitate a vacant factory according to LEED standards. This is the first time the Center is undertaking a construction project and, as such, it is a unique learning experience that the Center hopes to share. By carefully documenting its own design and construction process, the Center will develop signage, graphics and other multi-media features that will help its new home serve others as an interactive guide for creating and inhabiting sustainable spaces in the City.

Green Highlights

The Center is looking to maximize energy efficiency and is designing the building to obtain all possible points in the LEED Energy and Atmosphere category. The project is proposed to achieve energy savings 15% better than ASHRAE 90.1 2004, which is a higher standard than the current New York State Energy Conservation Code. In the future, the Center is also looking to incorporate a ground source heat pump/geo-thermal system to heat and cool the space. This low-impact system would have higher upfront costs, but would allow the Center's new space to run efficiently with reduced operating costs, energy use and CO₂ emissions.

The Center has accessed financial incentives from the New York State Energy and Research Development Authority (NYSERDA). The NYSERDA New Construction program provides cost-sharing for technical assistance with energy modeling as well as incentives for



Exterior rendering of new BCUE facility

implementing a variety of energy efficiency measures. The Center is specifically using its NYSERDA award to work with a New York based consulting engineering firm, the EME Group, to develop the fundamental commissioning plan (a prerequisite for LEED) which will help ensure that all operating systems perform as designed.

NYSERDA will also be providing financial incentives for the installation of the Center's photovoltaic system located on the roof. Using a NYSERDA approved vendor allows the Center to receive the benefits of up to a 30-40% rebate on the total costs of equipment and installation, putting them above the LEED credit for renewable energy.

Lessons Learned

With an eye toward following integrated design principles, the Center partnered with several well-established New York-based green building consultants. The mix of experts armed the Center with valuable insights, important in decisions regarding some costly technical systems. For example, deferring installation of the geothermal system saved time and reduced costs. Since the Center's first test well did not yield positive results, the project team determined it was in its best interest to move to an efficient, more standard HVAC system that did not compromise their energy savings but which allowed for the installation of the geothermal system in the future. They also advised the architect to consider alternatives to fiberglass for insulating the walls and to close off the ducts during construction to protect the air quality of the construction site.

“Green building necessitates a dialogue between all design parties, and this can prove difficult to achieve given time and budget constraints. However, the long-term benefits of integrated design can be substantial and you begin to see the resultant cost-savings during construction. “

-Gita Nandan, Green Design Consultant

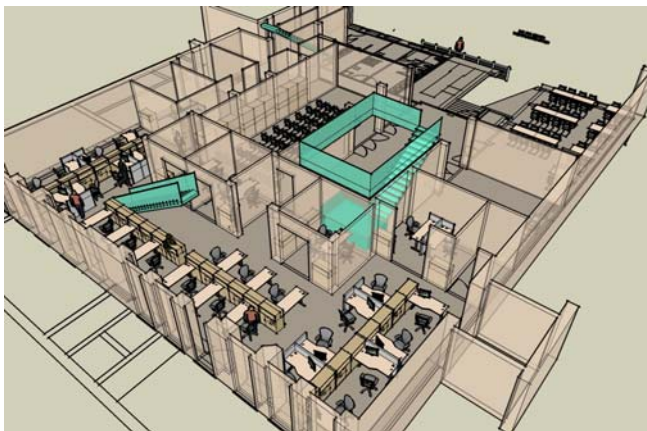
While the integrated design process resulted in many important improvements, the Center would change three elements on future projects:

(1) The Center would have hired a full-time project manager with green building experience to act as an owner's representative as the process was complicated and time consuming. (2) The Center would have only considered architectural

firms with green design experience, preferably with LEED Commercial Interiors, to avoid hiring additional green design consultants. (3) While the Center chose a small, non-profit oriented general contracting firm after design was completed, in retrospect the Center would have preferred to find a similar firm with green construction experience and/or to involve the General Contractor earlier in the design process.

Had consultants been hired accordingly, the Center believes they would have been able to pursue the LEED point for enhanced commissioning, which is valuable in securing long-term operating savings. However, the point requires an extensive review of architectural and mechanical systems and therefore substantial coordination between LEED accredited engineers, architects and energy consultants, which the Center was not able to accommodate due to budget and time constraints.

Another challenge the Center faced was designing green in a leased space, where the group does not control all the building systems. In this circumstance it is difficult to employ building envelope strategies, such as green roofs, exterior alternative energy installations, including solar and wind, and insulated windows. While the Center could not incorporate all of these elements, the group



discussed them with their landlord, opening a dialogue on mutually beneficial improvements to the building's energy efficiency. As a result of these conversations, the landlord agreed to set aside 2,000 square feet of the roof for the installation of solar panels and to paint the

Interior rendering of new BCUE building

entire roof silver, which will add to the efficiency of the system. In addition, the landlord will provide \$370,000 toward leasehold improvements.

Overall, the Center found the green design experience rewarding and would build future construction in a similar manner.

THE COOPER UNION NEW ACADEMIC BUILDING

PROJECT TEAM:	
<u>Role</u>	<u>Firm</u>
Project Lead	The Cooper Union for the Advancement of Science and Art
Architect	Thom Mayne, Morphosis; Gruzen Samton
Energy Consultant	Davis Langdon
Owner's Representative	Jonathan Rose Companies
LEED Accredited Professionals	IBE Engineers, Gruzen Samton, Davis Langdon and Syska Hennessy Group
General Contractor	Sciame Construction
ADDRESS:	41 Cooper Square, Manhattan
LEED RATING:	Designed to meet LEED-NC Gold
START DATE:	Fall 2005
END DATE:	Spring 2009
TOTAL AREA:	174,000 square feet
TOTAL COST:	\$150 Million

Organizational Background

Established for the study of architecture, fine art and engineering, The Cooper Union is an all honors college that has provided a full tuition scholarship to every admitted student for almost 150 years. To maintain its position as one of the nation's premier institutions of higher education, The Cooper Union developed a strategic plan to modernize its facilities, enhance its academic programs and renew its financial strength, with the promise of maintaining its full-tuition scholarship policy far into the future. To support the plan, the college has thus begun a \$250 million dollar capital campaign with a substantial commitment toward the construction of a technologically advanced facility on land the college leases from the City of New York in the East Village.

Green Highlights

The Cooper Union established three major goals while planning its new academic building: to create an exceptional facility for teaching and learning; to create a building that would contribute significantly to the architecture of New York City; and to create a building that, in concert with the college's mission and areas of specialization, would be built to the highest standards of environmental sustainability. When complete, the project will be the first LEED certified academic laboratory in New York City built to the LEED Gold standard.

The New Academic Building will incorporate a range of green elements including: radiant ceiling panels that heat and cool, saving energy and improving occupant comfort; a co-generation plant that utilizes waste heat; a green roof that is irrigated exclusively with rainwater and mitigates the heat island effect; materials that are rapidly renewable, such as bamboo veneer, and regionally manufactured materials comprised of recycled content such as glass terrazzo. Additionally, the building is designed to maximize day-lighting and air circulation; and throughout the building process, construction and demolition waste will be recycled.



Groundbreaking of The New Academic Building, May 9, 2007

A measurement and verification plan is also being developed to track utilities usage for sustainability purposes as well as to educate students.

The project team has placed special emphasis on commissioning as a means of addressing The Cooper Union's goals of sustainability and education. The intent of the commissioning process is to verify that the building's energy-related systems are installed, calibrated and performing as designed. This will optimize energy and cost savings as well as occupant comfort. The commissioning agent on the project has been a critical member of the design and construction team since early in the design. In collaboration with The Cooper Union's faculty and students, the commissioning agent is also reviewing all energy-related submittals and working closely with the various subcontractors during the installation process. The agent will also advise the client and assist in operator training during the building turnover and early occupancy stages of the project.

Lessons Learned

The Cooper Union was careful in assembling the right design team to achieve its goals. The college engaged Jonathan Rose Companies early in the process as its owner's representative because of the consulting firm's demonstrated commitment to sustainability. With the owner's representative on board, The Cooper Union conducted a rigorous, international search for an architect and required that team members have LEED accredited professionals with substantial green design experience. The goal was to assemble a team capable of integrating sustainability into design, engineering and construction, from the beginning.

As the design began to emerge, The Cooper Union maintained a clear commitment to building green. It held focused eco-charettes with the architect and contractor to develop green goals for the project. Encouraged by the design team, The Cooper Union made several site visits to examine new technologies and to understand experimental opportunities for the project, including radiant heating and cooling panel installations and buildings with movable facades. The Cooper Union also made a commitment to appoint operations staff with the appropriate knowledge and experience to manage and maintain this complexly

designed building. The college leadership believes that its expressed commitment throughout design, construction and operations has been critical to fully achieving all sustainability goals.

“We absolutely had to have a sustainable building in this great urban setting. Looking to the future we, as a civilization, won’t be able to survive unless we pay much more attention to the environment, much more attention to energy efficiency. “

-George Cambell Jr., Cooper Union President

On energy issues in particular, The Cooper Union found it beneficial to bring on energy consultants early in the design process to run energy models and guide schematic design decisions. There was also creative thought given to financing certain green elements, including identifying “third party owners” of energy generating equipment who could help eliminate some of the upfront capital costs.

The Cooper Union also found it extremely valuable to designate the architect as the person to prepare the LEED documentation for efficient integration of green elements. Architects who do not have experience with LEED documentation may consider hiring a supporting consultant who specializes in LEED certification.

FUNDING SOURCES AND FUNDRAISING STRATEGIES

As interest in green building has grown, so has the variety of funding sources on the local, regional and national levels to facilitate environmentally-friendly design.

In general, you will find two types of funding sources, operational and capital, that may apply to your green project:

- **Operational funding:** e.g., for soft costs, including energy audits and/or planning to develop strategies to reduce energy consumption on a building level as well as programs that promote sustainable practices at a community level or product innovations by dedicated businesses and nonprofits
- **Capital funding:** e.g., for hard costs, including financial incentives for commercial buildings; low-interest loans for nonprofit facilities; subsidies for individual homeowners

Similar to green building overall, green building finance is an emerging field that offers many opportunities. However, there is no one-size fits all approach. For example, whether your organization qualifies for government or foundation funding will depend on the type of project you are considering and your tax-exemption status (typically, only 501(c)(3) organizations are eligible for foundation and government funding). To help you develop a fundraising strategy, below is a list of some potential funding sources and resources, especially for non-profit developers in New York City.

Operating Resources

Bank of America Neighborhood Excellence Initiative (Grant)
\$5,000-\$200,000 in operating support for non-profits with demonstrated excellence in neighborhood development
Eligibility: Non-profits
URL: www.bankofamerica.com/foundation/index.cfm?template=fd_

Citi Foundation Building Communities and Entrepreneurs (Grant)

Supports community development corporations, intermediary organizations and community development financial institutions with operating support

Eligibility: Non-profits

URL: www.citigroupfoundation.org/citigroup/corporate/foundation/com.htm

EPA Environmental Justice Small Grant (Grant)

On average, \$20,000-\$25,000 awards for well-designed strategic plans to build partnerships and work towards addressing local environment and public health issues

Eligibility: Non-profits

URL: www.epa.gov/compliance/environmentaljustice/grants/ej-s

Kresge Foundation (Grant, Technical Assistance)

\$25,000-\$100,000 in planning grant support for integrated design projects leading to sustainable design

Eligibility: Non-profits

URL: <http://kresge.org/content/displaycontent.aspx?CID=26>

Pratt Center for Community Development (Technical Assistance)

Provides low-cost or free architectural services and real estate development assistance to community-based organizations. Currently focused on child care, community-partnered public schools, libraries, green roofs, parks and community and cultural centers

Eligibility: Non-profits

URL: www.prattcenter.net

Capital Resources

EmPower New York (Rebate/Grant)

On average, 75% coverage of the installation of efficient lighting and refrigeration equipment

Eligibility: 1-4 Family Residential/ Low-income Residential

URL: www.getenergysmart.org/wherelive/Power/overview.asp

Energy Conservation Improvements Property Exemption (Tax Credit)

Property tax exemption for the installation of energy efficient equipment

Eligibility: 1-4 Family Residential Buildings

URL: www.orps.state.ny.us/assessor/manuals/vol4/part1/section4.01/sec487-a.htm

Energy \$mart Loan Fund (Loan)

Provides a 6.5% interest rate reduction for up to 10 years on loans for energy efficient construction and renovations and renewable technologies

Eligibility: All building types
URL: www.nyserda.org/loanfund/default.asp

Energy Smart PV Incentive Program (Rebate/Grant)
Provides incentives for the installation of solar energy systems
Eligibility: All building types
URL: www.powernaturally.org/Programs/Solar/incentives.asp

Energy Star Commercial Buildings (Tax Credit)
Provides a federal tax deduction of up to \$1.80/square foot for buildings designed for 50% energy cost savings relative to ASHRAE 90.1-2001
Eligibility: Commercial buildings
URL: www.energystar.gov/index.cfm?c=Products.pr_tax_credits#s8

Enhanced Commercial/Industrial Performance Program (Rebate/Grant)
Provides incentives for facilities and contractors installing energy-efficient equipment
Eligibility: All building types except residential
URL: www.nyserda.org/Programs/Commercial_Industrial/cipp.asp

New York State Green Building Tax Credit (Tax Credit)
Provides income tax credits to owners and tenants of buildings which meet certain green standards
Eligibility: Most buildings except industrial
URL: www.dec.ny.gov/energy/1540.html

Non-Profit Finance Fund (Loan)
Provides financial assistance to non-profits through loan products, advisory services and workshops. Extensive experience financing non-profits and their facility projects and is a good resource at the early stages of projects
Eligibility: Non-profits
URL: www.nonprofitfinancefund.org

NYSERDA New Construction Program (Rebate/Grant)
Provides incentives and rebates for facilities installing energy-efficient equipment and facilities that achieve LEED certification
Eligibility: All building types
URL: http://www.nyserda.org/programs/New_Construction/default.asp

Small Commercial Lighting Incentive Program (Rebate/Grant)
Provides incentives for the installation of energy efficient lighting
Eligibility: All building types except residential
URL: <http://sclp.lightingresearch.org/index.asp>

GLOSSARY¹²

Adaptability: Design strategy that allows for multiple future uses in a space as needs evolve and change. Adaptable design is considered a sustainable building strategy since it reduces the need for major renovations or tearing down a structure to meet future needs.

Airborne Particulates: Total suspended particulate matter found in the atmosphere as solid particles or liquid droplets. Chemical composition of particulates varies widely, depending on location and time of year. Sources of airborne particulates include dust, emissions from industrial processes, combustion products from the burning of wood and coal, combustion products associated with motor vehicle or non-road engine exhausts, and reactions to gases in the atmosphere.

Alternative Energy: Energy from a source other than the conventional fossil-fuel sources of oil, natural gas and coal (i.e., wind, running water, the sun). Also referred to as "alternative fuel."

ASHRAE: American Society of Heating, Refrigeration and Air Conditioning Engineers. ASHRAE standards are often referenced as baselines for energy efficiency and thermal conditions.

Bioremediation: The cleanup of a contaminated site using biological methods, i.e., bacteria, fungi, plants, etc. Organisms are used to either break down contaminants in soil or water, or accumulate the contaminants in their tissue for disposal. Many bioremediation techniques are substantially less costly than traditional remediation methods using heat, chemical or mechanical means.

Brownfields: Abandoned, idled, or underused industrial and commercial facilities/sites where expansion or redevelopment is complicated by real or perceived environmental contamination. They can be in urban, suburban, or rural areas.

Building Cooling Load: The hourly amount of heat that must be removed from a building to maintain indoor comfort (measured in British thermal units [Btu]).

Building Envelope: The exterior surface of a building's construction--the walls, windows, floors, roof, and floor. Also called building shell.

Certified Lumber: General shorthand term for lumber that has been certified sustainable harvest by an independent certification authority. The Forest Stewardship Council (FSC) is the independent authority recognized in the US Green Building Council's Leadership in Energy and Environmental Design (LEED) Standard.

Charrette: A meeting held early in the design phase of a project, in which the design team, contractors, end users, community stakeholders, and technical experts are brought together to develop goals, strategies, and ideas for maximizing the environmental performance of the project. Research and many projects' experience has indicated that early involvement of all interested parties increases the likelihood that

sustainable building will be incorporated as a serious objective of the project, and reduces the soft costs sometimes associated with a green design project.

Commissioning (Building): The process of ensuring installed systems function as specified, performed by a third party Commissioning Authority. Elements to be commissioned are identified, installation and observed, sampling is conducted, test procedures are devised and executed, staff training is verified, and operations and maintenance manuals are reviewed.

Construction Waste Management: General term for strategies employed during construction and demolition to reduce the amount of waste and maximize reuse and recycling. Construction waste management is a sustainable building strategy in that it reduces the disposal of valuable resources, provides materials for reuse and recycling, and can promote community industries.

Cradle-to-Cradle: A term used in life-cycle analysis to describe a material or product that is recycled into a new product at the end of its defined life.

Daylighting: Using natural light in an interior space to substitute for artificial light. Daylighting is considered a sustainable building strategy in that it can reduce reliance on artificial light (and reduce energy use in the process) and when well designed, contributes to occupant comfort and performance.

Displacement Ventilation: Ventilation that uses natural convection processes to move warm air up and out of a volume. Displacement ventilation tends to use less energy than conventional forced air ventilation, as it works with natural convection processes.

Embodied Energy: The total amount of energy used to create a product, including energy expended in raw materials extraction, processing, manufacturing and transportation. Embodied energy is often used as a rough measure of the environmental impact of a product.

Energy Management System: A control system capable of monitoring environmental and system loads and adjusting HVAC operations accordingly in order to conserve energy while maintaining comfort.

Energy Modeling: Process to determine the energy use of a building based on software analysis. Also called building energy simulation. Common simulation software are DOE-2 and Energy Plus.

Fluorocarbons (FCs): Any of a number of organic compounds analogous to hydrocarbons in which one or more hydrogen atoms are replaced by fluorine. Once used in the United States as a propellant for domestic aerosols, they are now found mainly in coolants and some industrial processes. FCs containing chlorine are called chlorofluorocarbons (CFCs). They are believed to be modifying the ozone layer in the stratosphere, thereby allowing more harmful solar radiation to reach the Earth's surface.

Geothermal/Ground Source Heat Pump: These heat pumps are underground coils that transfer heat from the ground to the inside of a building. This type of heat pump can

realize substantial energy savings over conventional heat pumps, by using the naturally more stable temperature of the earth as its heat source.

Global Warming: An increase in the near surface temperature of the earth. Global warming has occurred in the distant past as the result of natural influences, but the term is most often used to refer to the warming predicted to occur as a result of increased emissions of greenhouse gases.

Gray Water Reuse: Gray water is wastewater composed of wash water from clothes washers and kitchen, bathroom and laundry sinks. Gray water reuse is a strategy for reducing wastewater outputs from a building, by diverting the gray water into productive uses such as subsurface irrigation, or on-site treatment and use for non-potable functions such as toilet flushing.

Green Roof: Contained green space on, or integrated with, a building roof. Green roofs maintain living plants in a growing medium on top of a membrane and drainage system. Green roofs are considered a sustainable building strategy in that they have the capacity to reduce stormwater runoff from a site, they modulate temperatures in and around the building, have thermal insulating properties, can provide habitat for wildlife and open space for humans, and other benefits.

Heat Island Effect: A "dome" of elevated temperatures over an urban area caused by structural and pavement heat fluxes, and pollutant emissions.

HVAC (Heating, Ventilation, and Air Conditioning): General term for the heating, ventilation and air conditioning system in a building. System efficiency and design impact the overall energy performance of a home and its indoor environmental quality.

Impervious Surface: A surface that sheds the precipitation falling on it, rather than infiltrating. Impervious surfaces can lead to excessive stormwater runoff and limit the amount of stormwater that remains onsite or recharges local aquifers.

Indigenous Planting: Landscaping strategy that uses native plants. Provided the natives are placed in the proper growing conditions; such plantings can have low, or zero supplemental water needs.

Indoor Air Quality (IAQ): ASHRAE defines acceptable indoor air quality as air in which there are no known contaminants at harmful concentrations as determined by cognizant authorities and with which 80% or more people exposed do not express dissatisfaction.

Infiltration: a. The penetration of water through the ground surface into sub-surface soil or the penetration of water from the soil into sewer or other pipes through defective joints, connections, or manhole walls. b. The technique of applying large volumes of waste water to land to penetrate the surface and percolate through the underlying soil.

Life Cycle Analysis (LCA): The assessment of a product's full environmental costs, from raw material to final disposal, in terms of consumption of resources, energy and waste. Life cycle analysis is used as a tool for evaluating the relative performance of building materials, technologies, and systems.

Low VOC: Building materials and finishes that exhibit low levels of "off-gassing," the process by which VOCs (Volatile Organic Compounds) are released from the material, impacting health and comfort indoors and producing smog outdoors. Low (or zero) VOC is an attribute to look for in an environmentally preferable building material or finish.

Modular Building: Building technique using modular, or pre-constructed components. Building on a "module" also refers to the concept of using standardized dimensions that reduce the amount of construction waste.

Occupancy Sensor: A sensing device, commonly connected to a room's lighting but also occasionally to heating or ventilation, that shuts down these services when the space is unoccupied.

On-Site Stormwater Management: Building and landscape strategies to control and limit stormwater pollution and runoff. Usually an integrated package of strategies, elements can include vegetated roofs, compost-amended soils, pervious paving, tree planting, drainage swales, and more.

Photovoltaic (PV) Cell: An electronic device consisting of layers of semiconductor materials fabricated to form a junction (adjacent layers of materials with different electronic characteristics) and electrical contacts and being capable of converting incident light directly into electricity (direct current).

Post-Consumer Recycled Content: A product composition that contains some percentage of material that has been reclaimed from the same or another end use at the end of its former, useful life.

Post-Industrial Recycled Content: A product composition that contains some percentage of manufacturing waste material that has been reclaimed from a process generating the same or a similar product. Also called pre-consumer recycle content.

Rainwater Catchment/Harvest: On-site rainwater harvest and storage systems used to offset potable water needs for a building and/or landscape. Systems can take a variety of forms, but usually consist of a surface for collecting precipitation (roof or other impervious surface) and a storage system. Depending on the end use, a variety of filtration and purification systems may also be employed.

Regional Manufacture: Goods produced within a certain radius of the project site. Using regionally produced goods is considered a sustainable building strategy in that it reduces the transportation impacts associated with the product, it often allows for a better understanding of the production process and increases the likelihood that the product was manufactured in accordance with environmental laws, and it supports regional economies.

Solar Orientation: Orientation of a structure for controlled solar gain is essential to the success of passive and active solar design elements. Sun charts and software assist in orienting a building for maximum solar benefit. Designing for solar considerations can substantially reduce both heating and cooling.

Thermal Break: Method of increasing the thermal performance of a material or assembly by reducing conductive heat loss. By inserting a less thermally conductive material in a material or assembly that bridges conditioned and unconditioned space, the conductive path is reduced or broken. An example is the thermal break featured in aluminum-framed windows.

Thermal Mass: A mass (often stone, concrete, or brick) used to store heat and reduce temperature fluctuation in a space, by releasing heat slowly over time.

U (U-Value): A measure of the amount of heat that flows in or out of a substance under constant conditions when there is a one degree difference between the air within and outside a building. U-values are used in determining the performance of a glazing system or window assembly.

GREEN RESOURCES

Local Resources

American Institute of Architects NY Chapter

Local chapter of the AIA that sponsors programs, hosts design competitions, publishes a newspaper and helps communicate architecture related information to the local community. The Chapter's Committee on the Environment focuses on green building issues.

www.aiany.org

GreenHomeNYC

Local non-profit organization that works to promote green buildings. Green Home NYC hosts a lecture series on green building topics the third Wednesday of every month.

www.greenhomenyc.org

Made In NYC

Online searchable database of products manufactured in New York City, searchable by green attributes.

www.madeinnyc.org

New York City Department of Design and Construction

City agency that manages construction projects and has completed several green building projects and developed *High Performance Building Guidelines*.

www.nyc.gov/ddc

New York City Economic Development Corporation

NYCEDC's website provides an overview of the metro areas's green industry including a map of design and construction related vendors.

<http://www.nycedc.com/Web/NYCBusinessClimate/IndustryOverviews/GreenIndustry/GreenIndustry.htm>

New York City Mayor's Office of Environmental Coordination (OEC)

OEC's green buildings webpage contains the regulatory documents related to Local Law 86. The page also provides information on the City's green buildings competition.

<http://www.nyc.gov/oec>

New York State Energy & Research Development Authority

Public benefit corporation created by the New York State Legislature that administers the **New York Energy \$martSM** program, which provides energy efficiency services, including those directed at the low-income sector, research and development, and environmental protection activities.

www.nyserda.org

New York State Green Building Initiative

Information on New York State's Green Building Tax Credit.

www.dec.state.ny.us/website/ppu/grnbldg/

Nonprofit Finance Fund

The Nonprofit Finance Fund (NFF) helps nonprofits build and renovate facilities, expand operations, fund growth needs and sustain operations over time. In addition to a suite of advisory and financing services, NFF also provides workshops on green building for nonprofits in the New York metro area.

<http://www.nonprofitfinancefund.org>

02 NYC

Local network of creative professionals that foster environmental sustainability through design.

www.o2nyc.net

PlaNYC

New York City's Long-Term Planning and Sustainability office and information on *PlaNYC*, the City's sustainability plan.

www.nyc.gov/planyc

US Green Building Council New York Chapter

Local chapter of the US Green Building Council that promotes green building and the LEED rating system. The local chapter hosts events and maintains a website with links to various articles and resources on green building.

<http://chapters.usgbc.org/newyork>

Additional Resources

American Council for an Energy-Efficient Economy

Non-profit organization dedicated to advancing energy efficiency as a means of promoting both economic prosperity and environmental protection.

www.aceee.org

BuildingGreen

Online resource featuring a searchable database of articles on green building and access to *Green Spec*®, a directory of over 1,600 green building products. BuildingGreen also features, *Environmental Building News*, a monthly newsletter devoted to green building.

www.buildinggreen.com

Energy Star

Joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices.

www.energystar.gov

Environmental Defense

Non-profit organization dedicated to protecting the environmental rights of all people, including future generations. Among these rights are clean air, clean water, healthy food and flourishing ecosystems.

www.environmentaldefense.org

Green Depot

On-line resource for green building products.

www.greendepot.com

Green Globes

An on-line guide and auditing tool to help integrate sustainable principles in the design of new or the remodeling of existing commercial interiors. The tool, Green Globes Fit-up, as the tool is called, provides analysis on energy and water efficiency, resource conservation, waste reduction, health and productivity. The program produces a detailed report based on a confidential questionnaire.

<http://www.greenglobes.com>

Green Seal

A nonprofit organization providing science-based environmental certification standards for products and services. Green Seal actively advises and assists a variety of institutions and industry sectors in their efforts to green their purchasing, operations, and facilities management functions.

<http://www.greenseal.org>

Kresge Foundation

The foundation provides green building planning grants and a series of educational materials designed specifically for nonprofits (available for download online.)

<http://kresge.org/>

Minnesota Building Materials Database

Online, searchable database documenting, evaluating, and disseminating usable information on sustainable materials, products, systems, and services for the commercial and residential building construction industry.

www.buildingmaterials.umn.edu

Natural Resources Defense Council

Non-profit organization that uses law, science and the support of 1.2 million members and online activists to protect the planet's wildlife and wild places and to ensure a safe and healthy environment for all living things.

www.nrdc.org

Rocky Mountain Institute

Non-profit organization that fosters the efficient and restorative use of resources to make the world secure, just, prosperous, and life-sustaining.

www.rmi.org

Smart Growth

Comprehensive site about many aspects of green design, especially grants and funding opportunities; searchable by state, issue, land development regulations.

www.smartgrowth.org

US Department of Energy—Energy Efficiency & Renewable Energy

Information on renewable and clean energy and alternative fuel vehicles

www.eere.energy.gov

US Environmental Protection Agency

Federal agency charged with protecting human health and the environment.

www.epa.gov

US Green Building Council

Non-profit organization comprised of leaders working to transform the way buildings and communities are designed, built and operated and has developed the Leadership in Energy and Environmental Design (LEED) rating system to certify the environmental performance of building.

www.usgbc.org

Wattbusters

Shopping site for energy conservation products, including lighting, window weatherstripping kits, water heater insulation kits, etc.

www.wattbusters.com

ENDNOTES

¹ Requiring sustainably-harvested wood products may be restricted by state contracting law as described on p. 18 hereof.

² Requiring locally or regionally produced materials may be restricted by state contracting law as described on p. 18 hereof.

³ Fowler, K.M and Rauch, E.M, *Sustainable Building Rating Systems*. Pacific Northwest Laboratory. July 2006. Accessed at www.aia.org/SiteObjects/files/COTENotes%20fall%2006%2022%20GSA%20Green%20Rating%20Systems.pdf on June 18, 2007.

⁴ U.S. Green Building Council, *Why Build Green?* Accessed at <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=291&> on June 13 2007.

⁵ www.epa.gov/greenbuilding/pubs/whybuild.htm Accessed on June 18, 2007.

⁶Ibid.

⁷ Baum, Mara. *Green Building Research Funding: An Assessment of Current Activity in the United States*. U.S. Green Building Council. Accessed at <http://www.usgbc.org/ShowFile.aspx?DocumentID=2465> on June 14, 2007.

Kats, Gregory. *The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force*. October 2003. Accessed at <http://www.usgbc.org/ShowFile.aspx?DocumentID=1992> on June 18, 2007.

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⁸Kats, Gregory. *Green Building Costs and Financial Benefits*. 2003. Accessed at www.cap-e.com/ewebeditpro/items/O59F3481.pdf Accessed on June 18, 2007.

⁹Gifford, Henry. *From Ruin to Rehab*. Home Energy Magazine Online. May/June 2000. Accessed at <http://www.homeenergy.org/archive/hem.dis.anl.gov/eehem/00/000513.html> on June 18, 2007.

¹⁰ www.usgbc.org and click on LEED. Accessed on June 14, 2007.

¹¹ www.nyc.gov/html/oec/html/sustain/1186.shtml

¹²Glossary extrapolated from <http://cityofseattle.net/dpd/GreenBuilding/OurProgram/Resources/Greenbuildingglossary/default.asp>