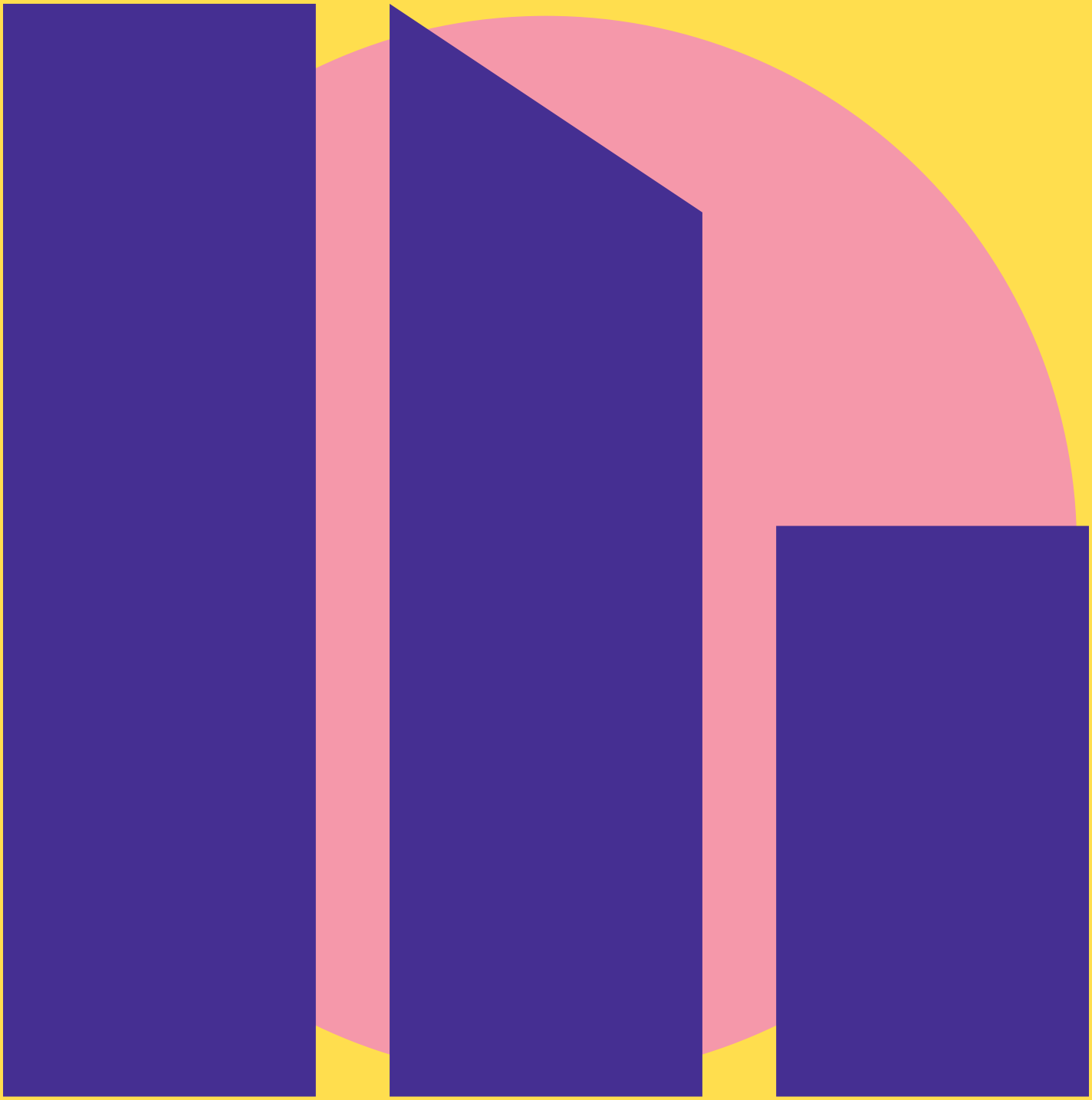
BRIGHT IDEAS

New York City's Fight for Light



October 2019

FIGHT FOR LIGHT

Dear New Yorkers,

Welcome to *Bright Ideas*, a summary of nearly a years' worth of research, debate, and conversation about the role of sunlight in the public realm. This project is a joint undertaking by our two organizations, which share more than a century of history advocating for balance in New York's built and natural environments.

Our partnership is inspired by the curious, unsettling observation that New York City's zoning code has strayed from its original mandate to protect public health and the public realm from the impacts of private development. The original Zoning Resolution was a response to shadows and obstructions to light and air that came with the introduction of the modern steel-framed skyscraper to an increasingly crowded city. But where other cities have continued to enforce these civic values, New York has sometimes fallen short.

Access to sunlight makes people healthier, parks greener, and cities stronger. This is not lofty conjecture; it is a statistical reality backed up by data, which we will present here. A city that fails to keep its built and natural environments in balance leaves itself vulnerable to the worst threats facing humanity, from the obesity epidemic to climate change.

And on that front, the stakes have never been higher. This summer alone, we watched 80,000 fires burn through the Amazon rainforest, marveled as millions of students joined Greta Thunberg in a global climate strike, and lived through the single hottest month in recorded history. In the midst of this gathering catastrophe, New York City has grown denser and darker—less equipped than ever to meet the challenges facing us.

This report grounds a campaign we're calling Fight for Light, which seeks stronger protections for the natural resources that are essential to an equitable city and the health and happiness of city dwellers. In preparation for this effort, we surveyed New York's regulatory landscape and solicited best practices from cities around the world. We were guided in this work by a task force of experts in architecture, engineering, environmental justice, law, planning, public health, and real estate who helped us shape an exploration of future policy directives.

Inevitably, some of the ideas presented here will be right for New York and some will not; but they each merit consideration. What cannot continue is the *de facto* privatization of sunlight while playgrounds, sidewalks, and parks are cast in shadow below.

We believe New Yorkers deserve better. We believe that light is worth fighting for. And we hope you will join us.

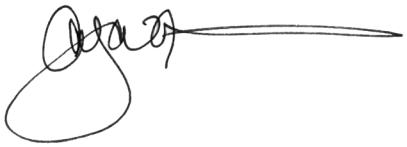


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TABLE OF CONTENTS

EXECUTIVE SUMMARY

New York City is at a critical moment. The quality of our public realm is under threat by a new generation of out-of-context developments whose impacts on light and air have largely been ignored by the zoning and planning processes we once relied upon.

The Fight for Light campaign itself gets its start from the Greenacre Foundation's effort to protect Greenacre Park, a historic pocket park on East 51st Street that is filled dawn to dusk with neighbors and office workers enjoying a respite in one of the densest neighborhoods in New York. Situated just outside the Greater East Midtown Rezoning area, this intimate park is expected to be cast completely in shadow during peak summer days as a result of new development, an outcome that received little attention during the course of the City's planning process.

Light and air are not fringe amenities; they are essential elements in our urban infrastructure. More than 100 million people visit New York City's parks every year. In a city where the overwhelming majority of residents live in apartments without yards, patios, or balconies, public spaces are our gathering spots.

This report will make the case for sunlight as an urban planning priority that directly impacts the health, ecology, environment, and economy of our city. We will examine New York's existing regulatory process and its current strategies for safeguarding light and air. We'll explore key concepts, like the difference between shade and shadow. And we will share ideas and best practices being tested in other cities that are already tackling this challenge.

While ideas from other jurisdictions are illuminating, we will also need to develop proposals that respond to New York City's unique planning context. To that end, we are laying out a multi-pronged approach to elevate light in our city planning process, particularly for projects affecting historically under-resourced communities. To oversee this urgent task, we propose the appointment of a Director of the Public Realm, with the staff and budget necessary to drive real change.

Safeguarding light and air is a pragmatic, common sense value in a city as dense as New York, but refocusing our planning process will take no small effort. The success of Fight for Light will depend on a broad coalition of people and organizations from the neighborhood level up representing broad areas of interest and expertise. It will also require a new commitment from our elected officials to invest in and defend New York City's public realm, the spaces between buildings where so much of civic life takes place.

But it will be worth it.

DEFINING KEY CONCEPTS

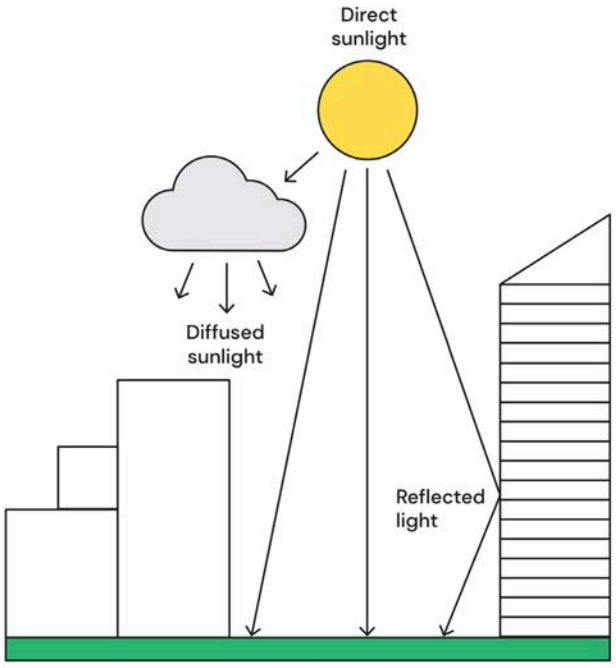
As we brought together professionals from diverse fields of expertise, we needed to create a shared language around common terms used when discussing light in public spaces. This section defines several terms used in *Bright Ideas* to describe concepts that are integral to protecting light in the public realm. The definitions were adapted from a combination of academic, non-profit, and private sector sources in the United States, Canada, and England.

Defining Sunlight

Sunlight is defined as light that is emitted by the sun and reaches the ground, including direct sunlight and sunlight diffused by cloud coverage, but excluding light reflected from buildings and other surfaces.[1]

Daylight is a broader category of light produced by the sun; it encompasses direct and diffused sunlight, as well as light reflected from buildings and other surfaces.[2]

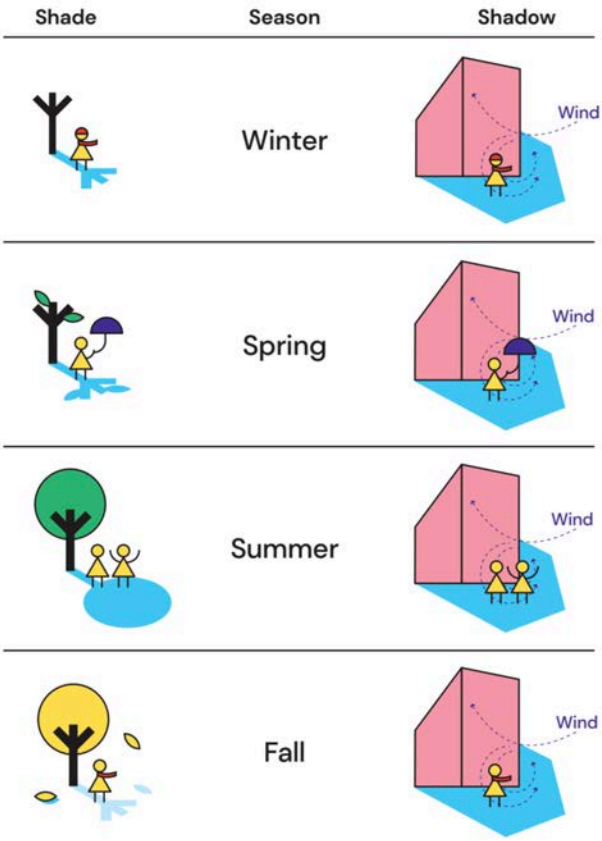
Sunlight and daylight are both distinct from artificial light, which is not a product of the sun. Artificial light can be emitted by interior and exterior lighting on buildings, signs, streetlights, and other manmade sources.[3]



Distinguishing Shadow from Shade

Shadows are created from the obstruction of sunlight by structures such as buildings. Shadows last the life-cycle of the buildings by which they are cast, which often spans many generations.[4]

Shade is created by a temporary or seasonal obstruction of sunlight. The way in which people experience warmth outdoors is moderated naturally by deciduous trees, whose leaves block the sun during the summer months and then fall away in winter, allowing more direct sunlight when it is cold and windy.[5]

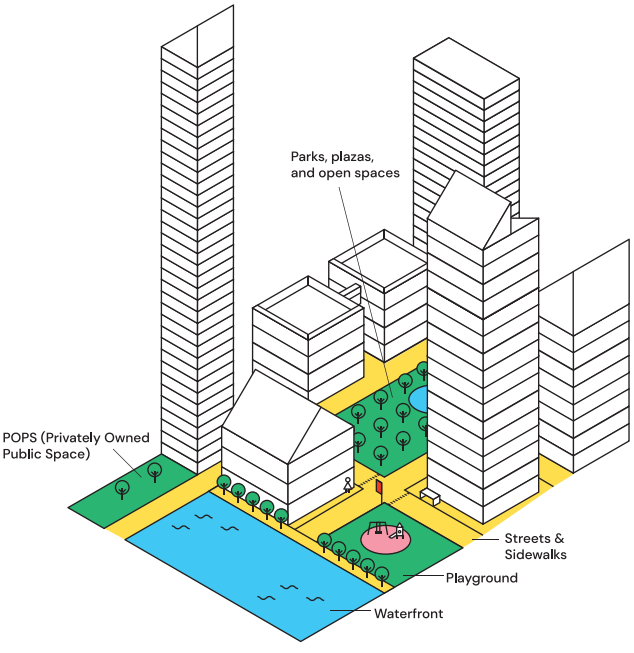


Defining the Public Realm

Bright Ideas considers the public realm in the broadest sense to encompass all publicly accessible exterior spaces. This includes the spaces in between buildings, such as streets, sidewalks, plazas, arcades, waterfronts, parks, playgrounds, and Privately Owned Public Spaces (POPS).

Open space is a more narrowly defined term for publicly accessible parks, playgrounds, waterfronts, and plazas used primarily for leisure, play, or sport, or that is set aside for the protection and enhancement of the natural environment.[6]

An additional glossary for other terms used in this report may be found at the end of the document.



Source: Flickr, The Commons, Britta Gustafson

MAKING THE CASE FOR SUNLIGHT

FRAMING THE ISSUE

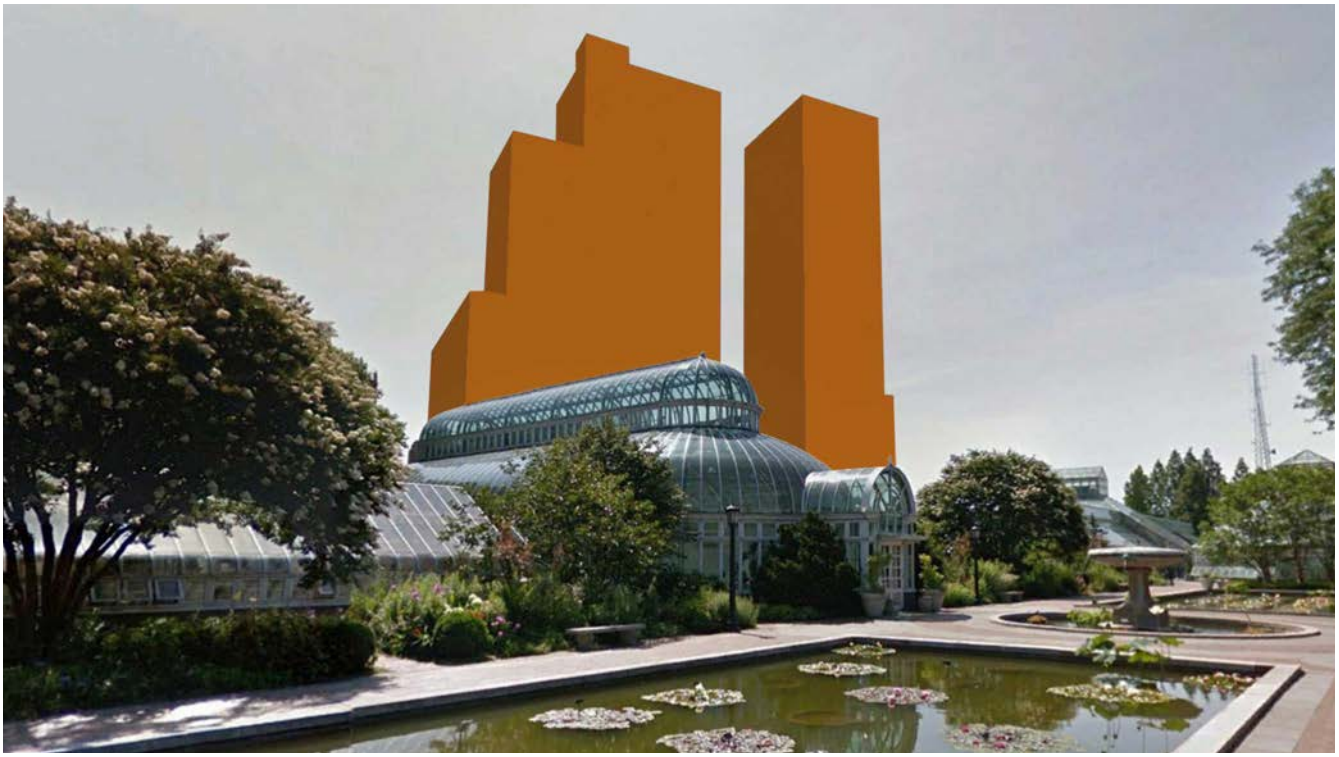
From Billionaire's Row to Crown Heights, we have seen the current planning process all too often succumb to the enormous development pressures bearing down on our city. And there is a notable absence of attention to sunlight as a pillar of an effective public realm. The result is that some neighborhoods are left in the dark by a planning process that was meant to protect their interests.

The vast majority of development in New York happens "as-of-right," meaning a project complies on a basic level with existing zoning regulations. These projects require no further zoning approvals from the City and no public review—even when they rise as part of a wave of new development. The cluster of as-of-right luxury towers that now loom over the southern half of Central Park are emblematic of the City's inability to protect the public realm from the cumulative effects of as-of-right development.

However, even when projects require discretional approvals by the City, sunlight all too often gets short shrift. In Manhattan's Two Bridges neighborhood, a pending, massive four-skyscraper development will bring 6,000 new residents to the area and place excessive strain on the area's already limited open space. Even though the project acknowledges that it will cast significant shadows on area parks, playgrounds, and the East River waterfront, there has been little effort made to offset these impacts.

This trend reaches far beyond Manhattan. In Downtown Brooklyn, Rockwell Place Bears Community Garden, a beloved local green space, will soon find itself cast in shadow by the new 845-foot skyscraper currently under construction at 80 Flatbush Avenue. It is unlikely that vegetation will survive once the development is completed. More recently, the proposed two-tower project at 960 Franklin Avenue will cast new shadows on the Brooklyn Botanic Garden and nearby Jackie Robinson Playground, two local resources that are vital to a neighborhood where open space is limited and dependent on sunlight for their success and survival.

One might think that neighborhood rezonings, one of the primary tools the City uses to facilitate redevelopment and affordable housing, would find space to consider sunlight protections or the creation of new open space. But very few of these City actions, which bring thousands of new residents and workers into densifying neighborhoods, offer meaningful ways to mitigate shadow impacts. This is especially striking when the neighborhoods



Renderings of proposed development at 960 Franklin Avenue in Brooklyn (Source: MAS)

being rezoned are typically communities already lacking sufficient public open space.

This has been a long-standing problem. The development that has resulted from the 2001 Long Island City rezoning is not only deficient in open space overall but has also resulted in spaces that are too dark and windy to be well-used. More recently, the 2019 Bay Street Corridor rezoning in Staten Island projected new shadows on the community's only outdoor recreational facility, a public pool, during peak summer hours. Yet no changes were employed to reduce impacts on the pool.

These recent developments demonstrate that sunlight has not been prioritized alongside other critical factors and considerations in the planning of future projects. The following section details why protecting our access to sunlight is so vitally important to urban livability.

Sustainability and Climate Change

Like the rest of the world, New York City faces the prevailing challenges of climate change, with rising temperatures, more frequent and intense precipitation, and dramatic sea level rise. These threats are due largely to the major increase in worldwide greenhouse gas emissions that has occurred over the past several decades. While the assumption may be that the sun and the heat it generates contribute to the issue, the sun itself is actually one of our best tools for addressing the effects of climate change.

In New York City, buildings account for 80 percent of greenhouse gas emissions,[7] in large part due to the use of fossil fuels for the energy used to heat, cool, and power them. Recent City and State legislation and policy measures seek to achieve sustainability goals of curbing emissions through solar power generation, more carbon-storing vegetation, and reduced reliance on artificial lighting.

However, in order for these strategies to succeed, ample sunlight must be available. According to a 2011 analysis by the City University of New York, two-thirds of New York City's rooftops are suitable for solar panels, which could generate enough energy to meet half the city's demand for electricity during peak times.[8] Major solar initiatives are already underway, such as Project Solar in Stuyvesant Town, where the installation of more than 9,000 solar panels will be the largest private multi-family rooftop solar array in the United States.[9] Yet shadows cast by tall and bulky buildings undermine efforts to install rooftop solar, discouraging investment in these strategies absent protections.

As mentioned, achieving energy independence and reducing greenhouse gas emissions also requires increased vegetation. Trees and plants moderate heat and reduce air temperatures by capturing CO_2. According to a study by the United States Department of Agriculture, trees store an estimated 1.2 million tons worth of carbon in New York City, a service valued at $153 million.[10]

Urban environments with ample vegetation are also better equipped to manage rainwater and flooding[11]—an important function in New York City, where wetter summers and sea level rise threaten livability. The same study also found that New York City trees reduce runoff by 69 million cubic feet per year, an annual value of $4.6 million.[12] There will be a growing demand for additional tree canopy—especially in denser neighborhoods with less vegetation—as New York's summers become hotter and longer.

Economic Viability

New York City's public realm is a major contributor to the tourism industry. In 2014, Central Park welcomed 13.7 million people from outside the New York metropolitan area, including 8.3 million international visitors.

Spending by these individuals directly and indirectly supported 1,871 jobs, generated $87.5 million in earnings, and $203.8 million in economic output.[13]

The economic value of a vibrant public realm is not just evident in the city's best-known parks. Simple street interventions have major benefits for retail businesses. Studies have shown a 12 percent increase in retail revenue where trees have been introduced. Portland, Oregon, has quantified the returns from investing in the city's tree canopy, attributing $15.3 million in additional tax revenue in 2010 to increased tree coverage.[14]

Additionally, well-designed public open spaces can help attract new businesses. A 2016 report by Regional Plan Association found that due to investment in Hudson River Park between 2002 and 2013, the surrounding area saw growth in emerging sectors like health care (54 percent), retail (69 percent), management (77 percent), hotel and food (159 percent), arts and entertainment (171 percent), and education (277 percent).[15] An attractive and accessible public realm also draws talent to New York City, helping the city compete for creative workers who value access to sunlit public space.

Open spaces are also employment centers in their own rights: thousands of New Yorkers work for City, State, and nonprofit entities to maintain and program the public realm. Many of these jobs are accessible to those with a high-school level education, and provide a path to economic stability through the City's civil service. Moreover, these positions are part of the key sustainability work that ensures that open spaces in New York City fulfill their ecological functions.

As mentioned previously, protecting sunlight access not only ensures New York City's status as a global city, it enables the solar industry to flourish. A 2019 study by the non-profit Vote Solar found that achieving New York State's goal of installing 4.575 gigawatts in solar capacity by 2025 will add 11,253 jobs and yield an annual average of $664 million in economic benefits. Their analysis found that solar workers will receive $5.7 billion in earnings, with an average hourly wage of $41 per hour for on-site installations.[16] Solar energy also significantly reduces a household's monthly energy bill. In New York State, the average home with a solar energy system is estimated to save $19,000 over 20 years.[17]

Human Physical, Mental, and Social Health
Sunlight plays a critical role in our physical, mental, and social well-being. The outdoor public realm is where most New Yorkers receive direct sunlight, which is fundamental to basic biological functions.

Sunlight is the primary source of vitamin D, which unlike other vitamins, can be absorbed through the skin when exposed to UV radiation. Vitamin D regulates over 1,000 different genes that control nearly every tissue in the body. Its primary function is to manage calcium and phosphorous levels that support metabolic function, neuromuscular transmission, and bone mineralization. Insufficient amounts of vitamin D can prevent children's bones from forming properly. For adults, a lack of vitamin D can contribute to and worsen osteoporosis. [18]

Sunlight also regulates physiological functions throughout the body, including hormone levels and the sleep-wake cycle. Humans have an internal clock that is triggered by exposure to sunlight. Disruptions to this system have been linked to obesity, diabetes, depression, and metabolic disorders.[19]

Additionally, sunlight can impact mood and levels of depression in individuals. Seasonal Affective Disorder is a type of depression

Tulips in Midtown Manhattan (Source: Flickr, The Commons, Tavis Dowling)

that coincides with the winter months and is associated with a lack of sunlight exposure.[20] Research indicates that reduced access to sunlight can also impair cognitive function and the ability to heal. A study comparing recovery times for patients found that those with large windows with sunlight exposure recuperated more quickly than those with obstructed views.[21]

Humans not only benefit from direct exposure to sunlight; their health is improved by exposure to sunlight-dependent vegetation. Research demonstrates that experiencing nature can enhance cardiovascular health,[22] lower stress levels,[23] and reduce the prevalence of mood disorders.[24]

Sunlight is also an essential factor for enjoying the public realm. The warmth of the sun determines whether we are comfortable spending time outdoors, enabling us to partake in recreational activities. These activities support the emotional and physical health of New Yorkers. This is especially true for those who use our city's parks and open spaces as their front yards, back yards, outdoor gyms, and gathering places for their families.

Access, availability, and quality of green space differ by neighborhood.[25] Brownsville, Brooklyn, which is ranked among the least healthy neighborhoods in New York City with a life expectancy rate of 75.1 years (6.1 years less than the citywide average of 81.2),[26] is an example of how a lack of quality public spaces compounds other stressors facing a community. Harvey Lawrence, Executive Director of the Brownsville Multi-Service Family Health Center, describes the community's health outcomes as resulting from "a combination of things—housing, the lack of many different options for healthy food, lack of opportunity to have green space, or space where you could pursue outdoor activities and do it in a leisurely way."[27]

Survival of Plants, Animals, and Other Living Organisms

New York City's physical environment includes a range of built and natural landscapes, from some of the country's densest urban neighborhoods to forests, beaches, and salt marshes. In many New York City neighborhoods, the public realm is where humans and ecological systems coexist.

The city has 303 square miles of land and 520 miles of coastline, which together provide a rich ecosystem for more than 7,000 plant and animal species.[28] Its location along the Atlantic Flyway makes the city an essential resource for more than 350 migratory bird species[29] along their seasonal journey. Entire habitats are being restored thanks to the Department of Parks and Recreation's (NYC Parks) efforts to reintroduce native plant species.[30] And initiatives like MillionTreesNYC have helped create an urban forest that covers an estimated 21 percent of the city's land area.[31] This rich ecosystem benefits all New Yorkers[32] by providing necessary services such as air filtration, temperature regulation, noise reduction, stormwater runoff absorption, and sewage treatment.[33]

Yet these natural features in the urban landscape would not be possible without sunlight. Their survival is dependent on the process of photosynthesis, in which plants convert energy from the sun's rays into energy that enables them to grow and to provide sustenance to other living organisms.

While it is true that some plants can grow in low-light conditions, none can survive indefinitely in total darkness.[34] Plants straining to seek sunlight will use energy to grow long and thin instead of developing deep roots. This hinders their ability to keep soil in place, thereby increasing the possibility of erosion and reducing their ability to absorb and mitigate stormwater. Shadows can also lead to disease, pests, and fungi in planted areas by reducing the speed of water evaporation in soil.[35] While most parks and gardens in the city are already designed for semi-shaded environments, the loss of what little sunlight exists in these spaces could strip them of any vegetation.[36]

Source: Flickr, The Commons, Young Sok Yun

HOW NEW YORK CITY INCORPORATES LIGHT INTO ITS RULES AND REGULATIONS

Over the past century, through its zoning regulations and land use policy, New York City has sought to balance growth with the need to protect sunlight and air circulation as a matter of public health. This section explores New York City's zoning and regulatory history and examines recent sustainability, livability, and sunlight-related initiatives and policy measures that enhance the quality of life of New Yorkers.

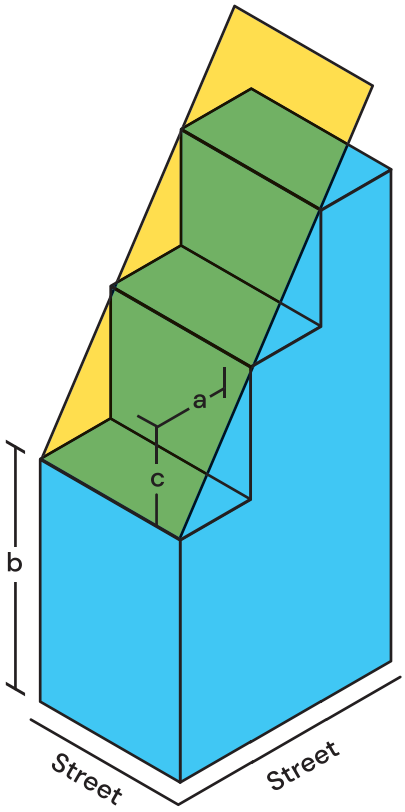
The Equitable Building (Source: Wikimedia Commons)

Following its completion in 1915, the Equitable Building, a hulking 42-story, 1.2 million-square-foot office tower on Broadway in Lower Manhattan, symbolized unregulated development and served as the catalyst for the adoption of zoning regulations. Rising to a height of 538 feet without setbacks from the street, the Equitable Building cast a shadow one-fifth of a mile long and blocked sunlight in office buildings across Broadway up to the twenty-first floor. Shadows were so severe that tenants abandoned nearby buildings in search of sunnier office space. Ultimately, property owners and realtors realized that reducing shadow impacts was in their financial interest.

Zoning

Zoning Resolution

The New York City Zoning Resolution was the first comprehensive citywide zoning code in the United States and serves as the City's primary tool to guide development. Adopted in 1916 and substantially amended in 1961, the Zoning Resolution regulates land uses, building height and bulk, and streetscapes. The original Zoning Resolution was a response to shadows and obstructions to light and air that came with the introduction of the modern steel-framed skyscraper. It also sought to address concerns about human health and safety, as well as the separation of incompatible uses in an increasingly crowded city.



a: Horizontal distance
b: Height of sky exposure plane above street line
c: Vertical distance
Sky exposure plane

Sky exposure plane

The Zoning Resolution affected the way buildings were configured, especially with regard to maximizing access to light and air in a city primed for the skyscraper age. It introduced the principle of a sky exposure plane, whereby buildings were set back based on street width, and upper floors followed the slope of the plane to allow exposure to light. The multi-tiered "wedding cake" buildings in New York City resulted from this regulatory approach.

Unhealthy and unsafe conditions in the city's overcrowded tenements, documented in photographs by Jacob Riis, also played a crucial role in the push for more zoning restrictions. The authors of the Zoning Resolution recognized that ventilation and sunlight were integral to human welfare and could be increased through controls on the built environment.[37] They framed it as a public health imperative.

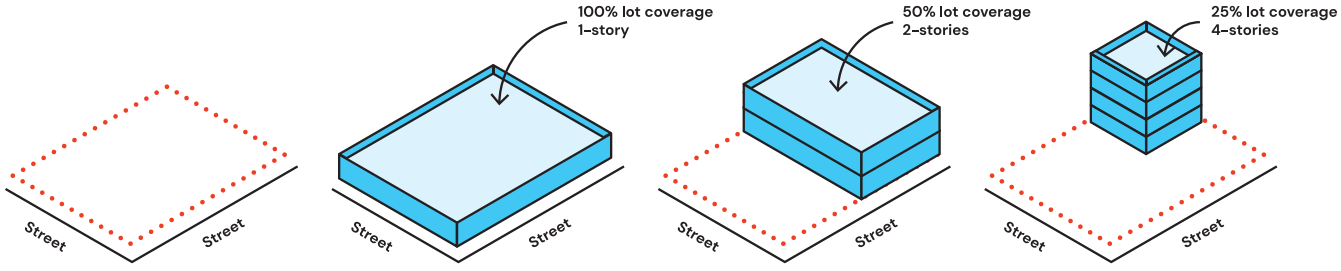
By mid-century, planning principles had evolved greatly. The age of the automobile inexorably changed the urban landscape and ushered in an entirely new way of viewing the built environment. With increased suburbanization, urban planners and elected officials were now promoting tall towers surrounded by open space as a replacement for the traditional model of the city block and human-scale density and height. It was under these circumstances that the Zoning Resolution was overhauled in 1961.

To increase access to light and air, the 1961 Zoning Resolution introduced incentive zoning, which provided property owners with additional floor area in exchange for the creation of plazas, known as Privately Owned Public Spaces, or POPS. To date, more than 500 POPS have been created citywide.[38] Over the years, other incentives have been added to the Zoning Resolution, including bonuses for the inclusion of affordable housing and the provision of healthy food in grocery stores.

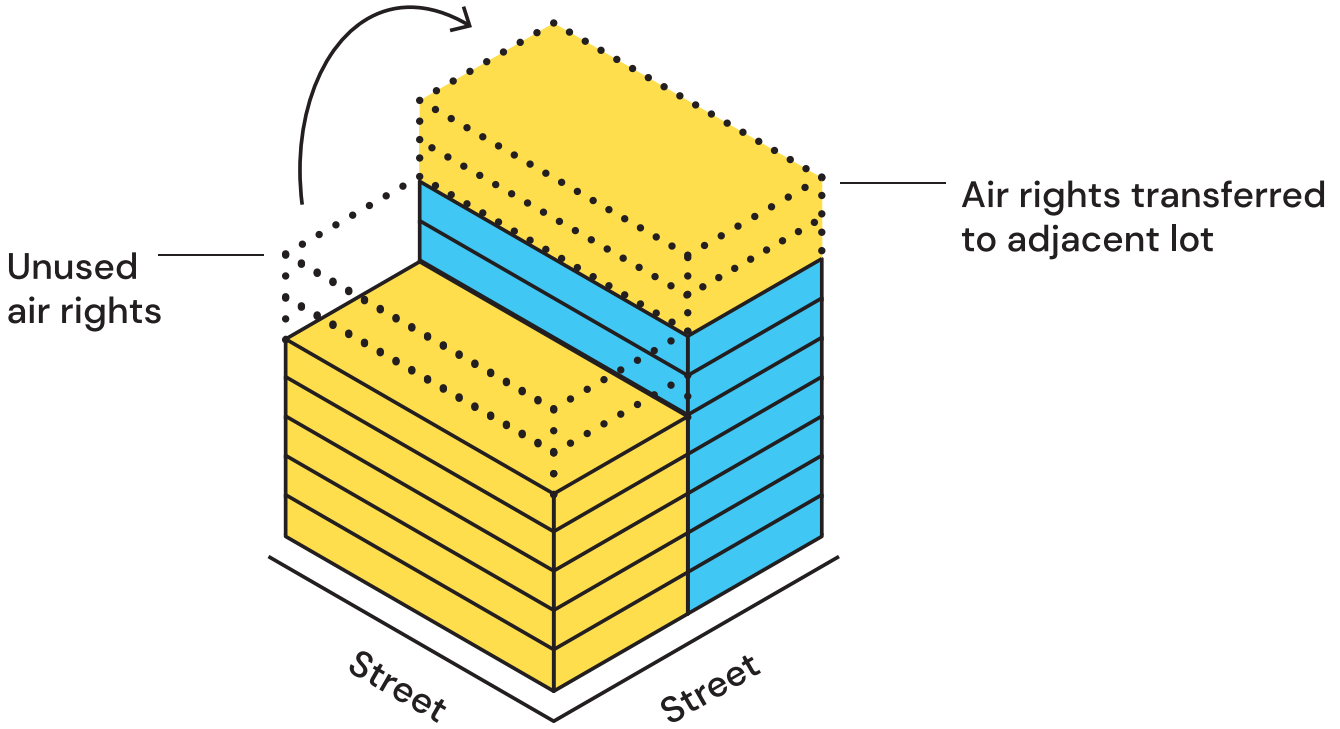
One of the most significant changes in the 1961 Zoning Resolution was the introduction of Floor Area Ratio (FAR)—the relationship between a building's floor plate and its lot area—as the primary tool to regulate building bulk, limit density, and add design flexibility. The 1961 Zoning Resolution also allowed property owners to transfer unused development rights, often referred to as "air rights," between adjacent properties to build larger buildings. This as-of-right mechanism added significant floor area and height to buildings. While the 1961 amendment ostensibly modernized zoning and framed the City's approach to future development, it did not adequately regulate the protection of sunlight in the public realm.

Special Midtown District

The office building boom of the 1960s transformed East Midtown into one of the city's densest commercial business districts. The majority of new buildings used zoning variances, special permits, and other zoning actions to build larger than would otherwise



Floor area ratio (FAR)

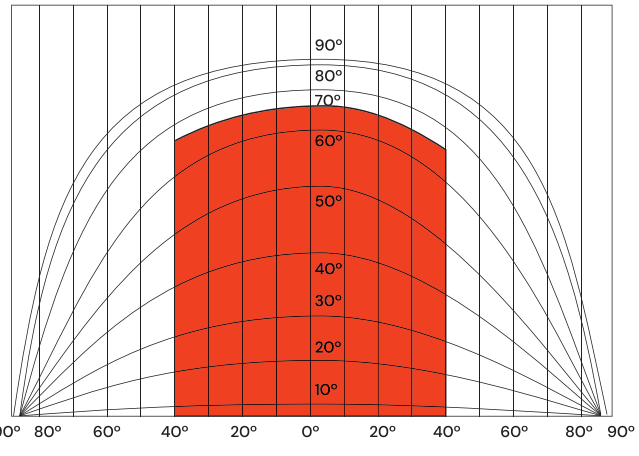


Transfer of development rights (TDR)

be permitted.[39] This led to development that darkened area streets and shrouded public plazas in shadow.

The Special Midtown District, adopted in 1982, was designed to direct development towards Times Square and West Midtown to protect the character of areas such as the Theater District. The Special District also marked the first time an American city incorporated a daylighting evaluation into height and setback zoning regulations to maximize sunlight exposure in the public realm.[40]

Daylighting assesses the amount of potential sunlight a particular building would obstruct. It uses the Waldram Diagram, a graphic representation of what a pedestrian would see if they were looking up at a building from the street through a fisheye (ultra wide-angle) lens. The diagram includes a grid of squares that represent lot frontage area that overlap the shape of a building agaist the sky. The evaluation calculates the number of squares that would be blocked by the building to determine the percentage of available daylight that does not reach the public realm. The zoning places penalties for each square that is covered by a building above a set elevation, and credits are given for unblocked squares below a certain elevation. The Special District's zoning requires that 75 percent of the sky remain exposed.



Waldrum Diagram

Greater East Midtown Rezoning
Greater East Midtown, the city's largest business district and a subarea of the Special Midtown District, was rezoned in 2017. The rezoning is expected to generate 6.8 million square feet of new commercial office space over the next 20 years. As part of the effort, the rezoning modified long-established daylight evaluation criteria, including lowering minimum daylight scoring standards on development sites to allow for larger commercial buildings.[41]

The rezoning also allowed a district-wide transfer of landmark development rights, which permitted owners of historic buildings to sell unused air rights anywhere within the rezoned area. This created a new layer of unpredictability for determining how densely development could be built, leaving more of the neighborhood's public realm vulnerable to shadow impacts.

Following the approval of the Greater East Midtown Rezoning, proposals for the new JPMorgan Chase headquarters tower on Park Avenue and Macklowe Properties' Tower Fifth building on 51st Street (neither identified as projected or potential development sites in the rezoning's Environmental Impact Statement) fueled lingering concerns that the rezoning did not mandate sufficient protections for sunlight to existing POPS and public spaces, including Greenacre Park. In fact, shadows from projected development under the rezoning would cover all of Greenacre Park during peak use times in the summer months.

Policy

Shadow Task Force Proposal
In response to the emergence of large buildings across the city, Council Member Mark Levine proposed the creation of a task force to examine the effects of shadows cast on city parks.[42] The bill was first introduced in 2015 and resurrected in 2018 after a spike in supertall construction (buildings 300 meters/984 feet or taller)[43] brought new urgency to the issue.[44] The law was referred to the New York City Council Committee on Parks and Recreation for review, but it has yet to proceed.

If passed, the task force would bring together representatives from multiple City agencies to study sunlight loss caused by new buildings and make recommendations to the Mayor and City Council on proposed development. The bill would require the task force to meet every six months and publish an annual report with their findings.[45]

Current City and State Initiatives
In addition to the aforementioned planning regulations and proposals, New York City and New York State have recently introduced major environmental and climate change-related initiatives and laws to strengthen New York's sustainability efforts. Below is a brief overview of several of these initiatives and how they address sunlight in the public realm.

Greener, Greater Buildings
In December 2009, the New York City Council enacted four bills intended to improve the energy efficiency of buildings in the city. These bills, along with several other related pieces of legislation, are part of the *Greener, Greater Buildings Plan*. The plan addresses a wide range of energy efficiency improvements in city buildings, including energy conservation standards for building renovations; annual energy benchmarking and disclosure; mandatory lighting system upgrades and tenant sub-metering; and mandatory energy auditing, retro-commissioning, and retrofits.[46]

Local Law 86
Local Law 86, enacted in 2005, requires

Shadows in Midtown Manhattan (Source: Flickr, The Commons, Jay Santiago)

projects that receive $10 million or more in City funds that involve the construction of a new building, a building addition, or substantial reconstruction to achieve a minimum Leadership in Energy and Environmental Design (LEED™) rating level. The law does not apply to buildings with predominantly residential or industrial uses. For work that is subject to the LEED™ rating level requirement whose construction costs are $12 million or more, buildings must reduce energy costs by a minimum of 20 to 30 percent below what is required under the New York State energy code. In addition, for projects with work that is not subject to LEED™ rating level requirements, but includes the installation or upgrade of certain types of heating, ventilation, air conditioning, and lighting systems, a minimum 5 to 10 percent energy cost reduction is required below the energy costs that would be incurred under New York State energy code requirements.[47]

OneNYC 2050

In 2019, New York City released *OneNYC 2050: Building a Strong and Fair New York*, an updated long-term sustainable development vision and strategy policy document that originated as *PlaNYC* in 2007. *OneNYC 2050* expands the City's efforts to address strategies on climate change, population growth, infrastructure, and equity. The update stresses the need for increased vegetation and green infrastructure to reduce the urban heat island effect and promote healthy neighborhoods. Curiously, *OneNYC 2050* does not address sunlight, but instead focuses on maximizing the efficiency of artificial lighting and reducing light pollution from buildings at night.[48]

Climate Resiliency Design Guidelines

The Guidelines were released by the Mayor's Office of Resiliency in 2017 and updated in 2019 and include best design practices for increasing the resiliency of City facilities. The guidelines encourage the use of climate

change data as part of the construction of capital facilities. While sunlight in the public realm is not an explicit focus, the guidelines provide strategies for mitigating the urban heat island effect through increased solar reflectance, tree plantings, and other vegetation.[49]

Climate Leadership and Community Protection Act

Passed by the New York State Senate in 2019, the Climate Leadership and Community Protection Act mandates that the State generate 70 percent of its power from renewable sources by 2030 and invest 35 percent of energy efficiency funds in disadvantaged communities. Solar energy plays a key role in meeting these targets. The bill establishes a State Climate Action Council that is responsible for creating a plan to meet greenhouse gas emission limits and attain net zero emissions in all economic sectors.[50]

Climate Mobilization Act

In April 2019, the New York City Legislature passed a package of bills that cap emissions on large buildings, reducing greenhouse gas emissions by 40 percent by 2030 and 80 percent by 2050. Critical to Fight for Light, the law will require most new buildings to use solar energy or vegetated roofs. In addition, the Act allows increased property tax abatements for green roofs, establishes an Office of Building Energy and Emissions Performance, and mandates a study on converting New York City's power plants to renewable energy sources.[51]

New Efficiency: New York

New York State Energy Research and Development Authority's 2018 report, *New Efficiency: New York* cites milestones for achieving energy efficiency and greenhouse gas emissions reduction goals. According to the report, these goals would be met through job training, improved energy codes and standards, and improving access to affordable energy initiatives for low-income consumers. With a goal of an overall energy savings equivalent of fueling and powering more than 1.8 million New York State homes, *New Efficiency* outlines strategies for utilizing more energy-efficient artificial lighting, but does not discuss increasing sunlight in the public realm.[52]

Source: Flickr, The Commons, Frej Berg

AN INVENTORY OF OPTIONS FOR PROTECTING SUNLIGHT IN NEW YORK CITY

Despite its effects on our health, the built and natural environment, and the livability of our neighborhoods, sunlight is often overlooked in New York City. However, numerous other places effectively plan with sunlight in mind and may provide direction. The planning tools that municipalities have developed cover a wide range of options, including citywide regulations, building performance measures, design guidelines, and incentive programs. Many of the approaches can be applied both broadly and on a site-specific level to account for different building typologies, densities, and sun position.

City of London under construction (Source: Flickr, The Commons, Michael Gwyther-Jones)

Comprehensive Plans

Comprehensive plans are widely used by municipalities to guide future land use decisions, balance competing private interests, and protect public investments. They also help communities plan in a way that advances interrelated goals and provides citizens and city government with an opportunity to shape a collective long-term vision for the future. Comprehensive plans are not regulations in and of themselves, but under the best circumstances they lead to policy changes, land use decisions, and other mandates designed to achieve particular benchmarks over time.

The London Plan is one of the best examples of how a comprehensive plan can be used to frame regulations for protecting sunlight in expansive and dense urban areas. Initially adopted in 2011 and updated in 2016, *The London Plan* provides guidance and criteria for decision-makers responsible for approving the location and design of buildings.

Unlike New York City, where the majority of construction occurs as-of-right, without public or environmental review,[53] development in London is subject to a highly discretionary review process.[54] This ensures that the impact of each building is considered in the context of preserving public amenities, preparing the city for climate change, and advancing other governmental priorities. A newly updated London Plan is expected to be released in early 2020.

The London Plan[55] includes several requirements for maintaining sunlight in the public realm, such as:

- Designation of specific areas where tall buildings are permitted, with criteria for assessing the appropriateness of buildings of this scale, including how they relate to the public realm;
- Analysis of shadow impacts for all new development, and their effect on

microclimate, wind turbulence, and reflected glare, among other factors;

- Additional daylight and sunlight assessments for all potential development in the city's downtown core, which is contained in a separate but related document referred to as *The Local Plan*;[56] and

- Assurance that daylight and sunlight protections in the city's downtown core supersede other light and air agreements that exist.

Though less detailed, the City of Minneapolis's 2018 comprehensive plan also makes specific recommendations for maximizing comfort in the public realm. Of particular relevance is its Pedestrian-Oriented Building and Site Design policy, which lists numerous ways the City seeks to accomplish this goal. Two that pertain directly to Fight for Light are:

- Encourage building placement that enables solar access, allows light and air into the site and surrounding properties, and supports energy efficient lighting; and

- Promote massing design that considers the impact of shadowing, particularly on public spaces, recognizing that extreme seasons make shadowed areas alternately desirable at different times of year.

To afford the benefits of these types of protections, New York City could study whether to:

Develop and adopt a comprehensive plan

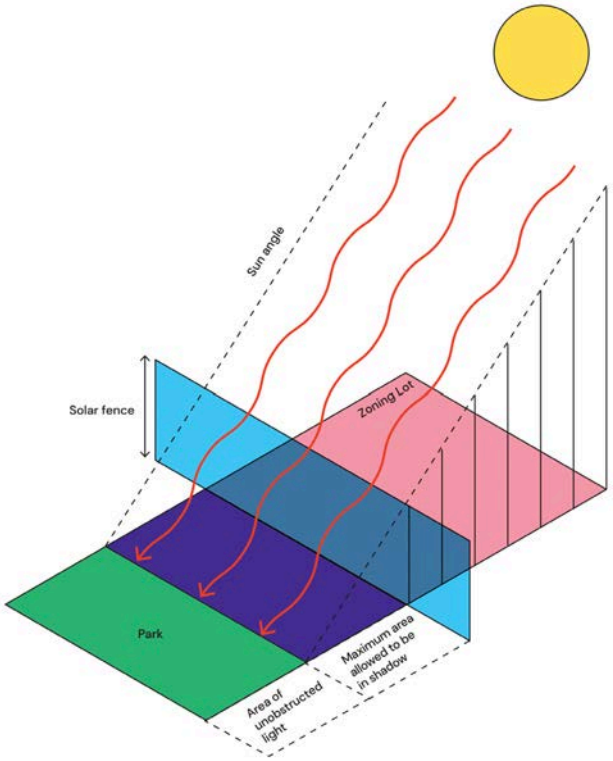
New York City does not have a comprehensive plan. As stated previously, the Zoning Resolution is the primary tool the City uses to guide development, but it is a blunt tool. To address this, the City has developed several individual policy documents that address such topics as climate change, sustainability, affordable housing, and neighborhood rezonings. However, a comprehensive plan may be the best way to identify and implement long-term, city-wide objectives. The most effective comprehensive plans unify planning actions, efficiently allocate resources to achieve economic, environmental and developmental goals, and frame actions at all levels of city government. Using *The London Plan* as a model, a comprehensive plan for New York City could better align zoning with the long-term goals and objectives of the various City policies, including strengthening shadow limits and solar access regulations. Because sunlight relates to a wide range of planning issues, a comprehensive approach may be needed to identify potential solutions to protect access to it.

Zoning Restrictions

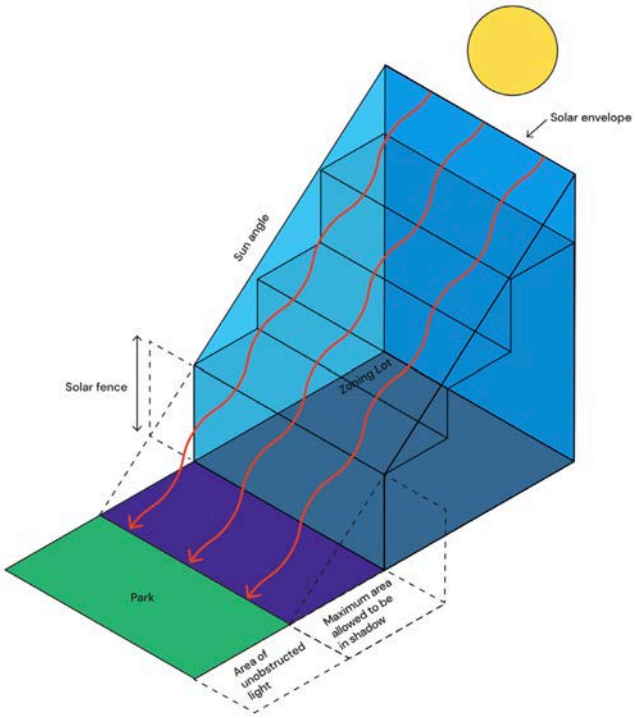
A city's zoning code regulates the types, intensity, and location of permitted uses as well as the allowable height, bulk, and scale of development. Since their inception, zoning codes have been used to help preserve light and air in the public realm. American cities in several Western states have built on this legacy by adopting new zoning mechanisms that strengthen sunlight protections.

One of the best examples is from Boulder, Colorado. In 1982, the City incorporated the concept of a solar fence into their zoning code to protect the availability of future sunlight.[57][58] A solar fence is an invisible boundary adjacent to a building that indicates the maximum shadow allowable during certain times of the year. Under the code, the shadow of the solar fence cannot be exceeded by new development that occurs on the site.[59] As described in Boulder's Solar Access Ordinance, the City has designated solar access areas where either 12- or 25-foot solar fences determine the maximum shadow allowable.

A solar envelope is a similar concept used by other municipalities. The solar envelope



Solar fence



Solar envelope

delineates a three-dimensional space over a parcel beyond which no construction or vegetation can occur without illegally interfering with the solar rights of neighbors.[60]

The land use code of Eugene, Oregon, has a specific Solar Standards section that is used to create lot divisions, layouts, and building configurations that preserve solar energy availability for one- and two-family dwellings. The Solar Standards require the designation of at least 70 percent of lots in subdivisions as "solar lots," with minimum lot dimensions, setbacks, and specific lot line orientations for maximizing sunlight access.[61]

Albuquerque, New Mexico, has a similar provision in its Integrated Development Ordinance, which prescribes zoning and subdivision regulations for land use and development. In order to maximize sunlight exposure in lower density residential areas, the Ordinance's Solar Access section details maximum allowable building heights according to distance from northern lot line boundaries.[62]

Despite many revisions over the years, New York City's Zoning Resolution remains an imperfect tool for regulating building heights and sizes. Zoning loopholes (such as gerrymandered zoning lots and unregulated, oversized void space for mechanical equipment) are often exploited by developers to build larger buildings than otherwise permitted. In many ways, zoning regulations have been outpaced by unforeseen advances in construction technology that have led to the proliferation of supertall residential towers throughout the city. Given the complexity of zoning regulations in New York, there is an understandable reluctance to overhaul the system. However, modifying the Zoning Resolution may be the most effective way to protect sunlight access in New York City. Below are a handful of potential strategies to enhance sunlight protections in New York City's Zoning Resolution:

Revisit past sunlight-related zoning proposals

Although solar envelopes and fences are not often applied to complex urban areas,[63] they provide a basis for possible changes to the Zoning Resolution. *Preserving Sunlight in New York City's Parks: A Zoning Proposal*, a 1991 proposal commissioned by the Parks Council (a predecessor to NY4P), presents a variation of solar envelopes and fences that could apply to New York City.

At the time of its publication, the study found that about 700 parks—roughly half of the City system—were at risk of being shadowed by future development. It proposed as-of-right zoning regulations aimed at protecting access to sunlight in parks and open space, permitting design options that reduce developer hardships. The plan sought to balance flexibility in the built form with the need for concrete, broadly applicable standards. To achieve this, the study introduced the concept of a solar access standard that would largely preserve the amount of sunlight available in parks by regulating where shadows are permitted. The study offered two alternative methods for determining whether new buildings would be in compliance:

- **The prescriptive method** defined the form of new buildings through a series of sun exposure planes (a variation of the solar envelope concept).

- **The performance method** managed the impact of new buildings by regulating where shadow is permitted. The shadow of the new building would need to fall within the average depth of existing shadows cast on a park, or within the shadow of an existing building.[64]

Since the release of *Preserving Sunlight*, significant advances have been made in the accuracy and reliability of technologies used to model sunlight, shadow, and other impacts. For example, ArcGIS and AutoCAD models can quantify the amount of solar radiation available, which could inform whether to change a building's massing and orientation and help determine the placement of solar panels.[65]

Establish special zoning districts that regulate for sunlight

Zoning for sunlight access could also be achieved by establishing special districts that offer sunlight protections. A special district is a zoning tool used to apply site-specific guidelines for the use and form of a particular area. Special districts add a layer of regulation to traditional zoning by promoting a specific character or use in a neighborhood.

Special districts are applied in many different contexts, ranging from arts districts to historic neighborhoods and natural areas. The Tree and Slope Protection (TSP) Overlay District in Washington, D.C., provides an example of the latter. Established in 1958, the TSP's purpose is to protect the park-like setting of certain neighborhoods situated next to streams or parks. The overlay regulates the removal of trees, changes to the terrain, and the siting of buildings.[66]

New York City provides similar oversight through its Special Natural Area District (SNAD) in parts of the Bronx, Queens, and Staten Island. The SNAD has regulations to preserve natural landscapes and vegetation, and requires site plan approval before building permits are issued.[67] Although special districts are a tool widely used by the City, only the Special Midtown District incorporates specific sunlight protection measures, implemented through daylighting evaluation standards.[68]

A solar access special district could:

- Designate shadow-sensitive areas to limit shadow impacts from new development.

Development along Central Park (Source: Flickr, The Commons, Bee Collins)

This may include parks, playgrounds, waterfronts, or other areas of the city where access to sunlight and green space is particularly scarce.

- Implement additional setback regulations to allow more sunlight to reach streets and parks. In anticipation of the rezoning of the Gowanus neighborhood of Brooklyn, the Gowanus Neighborhood Coalition for Justice, a local community-based organization, has proposed an Environmental Special District (or "Eco-District"), that would include additional setbacks to reduce excessive shadow along the Gowanus Canal.[69]

- Foster innovative building design to encourage more site-specific approaches than traditional zoning allows. For instance, the SNAD allows for yard, height, setback, and parking location variances in order to preserve natural features.[70] This challenges architects to design around restrictions, resulting in more inventive building forms.

City Environmental Quality Review

Another possibility for improving access to sunlight is by strengthening shadow impact evaluation criteria used in New York City's Environmental Quality Review (CEQR) process. CEQR is a State-mandated disclosure process that requires City agencies to identify and assess the environmental effects of discretionary actions (typically zoning actions, variances, and special permits) that they approve, fund, or sponsor. Among a wide range of environmental categories, CEQR assesses impacts related to traffic, air quality, noise, socioeconomic conditions, and shadows.

Federal and state law allows municipalities to adopt their own environmental quality review regulations as long as they are no less restrictive than the overarching mandates. Although the regulations may diverge in terms of evaluation criteria, analysis methodologies, impact thresholds, and mitigation guidelines, they are all based on the principle that the potential impacts of development must be

identified and those that are significant must be mitigated.

The CEQR Technical Manual, published by the Mayor's Office of Environmental Coordination, outlines the methodologies, analytical framework, and mitigation requirements for CEQR evaluations. A CEQR shadows analysis assesses the potential new shadow cast by a structure at least 50 feet tall, and its impact on sunlight-sensitive public open space and cultural, historic, and natural resources within a certain radius.[71]

Under CEQR, the primary analytical measure to determine impact is the extent and duration of a new shadow and whether it would affect vegetation or other natural resources, the public's enjoyment of open space, and sunlight-dependent features of open space and historic architecture. However, evaluations do not address new or cumulative shadows on the public realm other than public open space, nor shadows cast by development on newly created open space.

New York City could take a cue from the City of Los Angeles, whose environmental review regulations improve on CEQR's methodology for addressing shadows. The Los Angeles City California Environmental Quality Act (CEQA) Guidelines define shadow-sensitive uses more broadly, encompassing any "residential, commercial, institutional, or other land use types where sunlight is important to function, physical comfort, or commerce." For developments that cast a shadow on shadow-sensitive uses for more than three hours, or for more than four hours during certain times of year, the City may mandate a height limit of 60 feet or require that buildings be moved farther from shadow-sensitive uses.[72]
The following suggestions should be considered to strengthen the CEQR process, with the goal of reducing shadow impacts on public spaces and improving mitigation measures:

Amend criteria for projects reviewed through CEQR

Title 62, Chapter 5 of *The Rules of the City of New York* outlines the criteria that determine if an action may have a "significant effect on the environment."[73] The listed criteria range from adverse changes to water quality to the creation of hazards to human health, but do not include impacts resulting from reduced access to sunlight or major changes to solar energy potential. In addition, potential impacts are not weighted based on their effects on adjacent parkland or other sunlight-sensitive areas. Expanding the criteria could ensure that more sunlight-affecting projects are reviewed through CEQR.

Revise the shadow evaluation methodology in the CEQR Technical Manual

The shadow evaluation methodology in the CEQR Technical Manual could be amended to expand the scope of what elements are considered sunlight-sensitive resources. As mentioned previously, CEQR guidelines do not consider city streets and sidewalks or open space (including new parks) created by proposed developments to be sunlight-sensitive resources, leaving an important share of the public realm unassessed for potential shadow impacts.[74] Including these categories in the required assessment could ensure greater protections for spaces that New Yorkers rely upon for sunlight.

Thresholds could also be established for a subset of sunlight-deficient open spaces to ensure that no new incremental shadow increases occur. For open space adequacy evaluations, CEQR currently only recognizes "underserved" and "well-served" areas—categories defined by specific open space ratios, which indicate the amount of open space per thousand residents.[75] Similar categories could be established to record open spaces that are currently experiencing substandard or superior sunlight conditions.

Lastly, the methods for measuring shadows can be updated to incorporate more sophisticated analyses that use the latest modeling software. For example, tools that quantify energy levels on the ground, how shadows move and interact over the course of a day, and optimal temperatures for outdoor comfort.[76]

Create a Health Impact Assessment for New York City

Health Impact Assessments (HIAs) measure how a proposed policy, plan, program, or project will impact the health of a local population and how those impacts are distributed across the population. To do so, they use an array of data sources and analytic methods, considering input from a variety of stakeholders.[77] This method has won broad support from organizations including the American Planning Association, World Health Organization, and the Centers for Disease Control and Prevention for its ability to provide communities with a voice in the planning process and to achieve positive public health outcomes.

HIAs are traditionally conducted in response to pressing issues facing communities, such as the availability of affordable housing or clean drinking water. In New York City, HIAs have been conducted by Van Alen Institute and Cornell University to assess the impacts of the impending L Train shutdown, and by The New York Academy of Medicine to inform implementation of the housing component of the East Harlem Neighborhood Plan. Although HIAs don't explicitly measure shadow impacts, they have a flexible framework for evaluating issues raised by community stakeholders, such as the availability and programming of public open space. This system could either work in tandem with or be incorporated into the CEQR process to provide additional oversight of development. When successfully applied, this health-driven approach can allow the built environment to enhance the livelihoods of residents, particularly vulnerable populations.

Public Open Space Shadow Laws

A select number of cities around the world have enacted legal protections to prevent new shadows from being cast on designated public open space. In Boston, a pair of state laws (Boston Common Shadow Law and the Public Garden Shadow Law) restrict new shadow on the Boston Common and the adjacent Public Garden to the first hour after sunrise or the last hour before sunset.[78] In San Francisco, Proposition K (colloquially known as the "Sunlight Ordinance") was passed in response to concerns over shadow impacts on public spaces. The 1984 ballot measure requires that the Planning Commission conduct a shadow analysis for any new building over 40 feet in height that would shadow parks controlled by the Recreation and Park Commission.[79]

More recently, Melbourne's city council introduced an amendment in 2018 to preserve sunlight access to public parks, recognizing sunlight's importance to human and environmental wellbeing. Though still undergoing public review, the "Sunlight to Public Spaces" policy recommends regulations that prohibit additional shadowing on all parks between 10:00 AM and 3:00 PM.[80]

No such open space laws exist in New York City, even for internationally celebrated and historically significant spaces such as Central Park, Prospect Park, Pelham Bay Park, Flushing Meadows Corona Park, and Freshkills Park. These destinations aren't the only places that would benefit from protections—all public open spaces throughout the five boroughs that serve a diversity of New Yorkers are at risk. Based on these factors, the following could be further studied by the City:

Establish shadow laws for public open space

Similar to its protection of landmarks and views of the Brooklyn Heights Promenade,[81] the

Boston Common (Source: Flickr, The Commons, Massachusetts Office of Travel & Tourism)

City could protect large neighborhood parks and other shadow-sensitive open spaces by enacting shadow laws. The laws would require rigorous enforcement, as lessons from other cities suggest that they are easily overlooked in the face of development pressures or in balance with other public benefits. Successful application of shadow laws could encourage building scales and designs that are more sensitive to the sunlight-dependent nature of the surrounding landscape.

Solar Easements and Access Provisions

The right to sunlight is a centuries-old concept. In England, the first national sunlight law was passed in 1663 and has since guaranteed sunlight to property owners as a matter of course. Referred to as the "Ancient Lights" doctrine, this legal right goes into effect after a specified period of time of enjoying unobstructed access through windows and prevents neighboring properties from blocking the sun's rays.[82]

Although much of the United States' legal system was inherited from British courts, the doctrine of Ancient Lights was largely rejected nationwide by the late-nineteenth century due to concerns that the law would inhibit development.[83] In the absence of a federal mandate, individual states have adopted laws and court systems have tested legal arguments regarding sunlight accessibility. Of particular relevance are statutes and case law that protect homeowners' investments in solar energy. This body of law has grown in response to the rise in solar energy production and recognizes the importance of sunlight as critical public infrastructure.

The argument for the right to sunlight is grounded in the following legal easement concepts:

Land: An interest in land owned by another person, consisting in the right to use or control the land, or an area above or below it, for a specific limited purpose.[84] For instance,

Protected windows in London (Source: Wikimedia Commons, Mike Newman)

a property owner who must drive through a neighboring property to reach the street may obtain a land easement to legally access the driveway that passes through their neighbor's yard.

Solar: An easement created to protect a land owner's exposure to direct sunlight.[85]

Light and air: An easement that prevents an adjoining landowner from constructing a building that would prevent light or air from reaching their neighbor.[86]

More than 40 states have adopted statutes that recognize solar access or the right of a property owner to install a solar energy system.[87] California offers a prime example of how the right to sunlight is written into state law. Established in 1978 as a state regulation, California's solar easements grant the "right of receiving sunlight across real property of another for any solar energy system."[88] A solar easement can only be sought for securing sunlight to operate a solar energy system, and not for some other purpose.

Currently, New York State law acknowledges the right for land easements to exist but does not definitively protect the right to solar energy access.[89] New York could explore the following:

Study the feasibility of adopting a State and/or City statute for solar access

As discussed previously, both New York State and New York City have set ambitious goals for renewable energy. In light of these commitments, property owners' right to sunlight will require additional protection. Given New York City's density and continued growth, introducing solar easements would require especially creative thinking around how this concept could be put into practice.

Incorporate sunlight into the transfer of development rights system

New York City's transfer of development rights (TDR) system provides an opportunity for negotiating solar access considerations. As

part of this process, property owners who wish to protect their solar access could approach neighboring property owners about selling unused FAR. In 2016, tenants of a building on West 17th Street in Chelsea exercised this right. By collectively purchasing the remaining development rights of a neighboring site, they were able to limit future development on that lot from exceeding four stories.

Despite its contradictions and shortcomings, the current TDR system can be modified to achieve greater sunlight protections. Unused FAR could be transferred to carefully mapped receiving areas where greater building heights would have less impact on an adjacent property's ability to obtain energy from the sun's rays.[90]

Design Guidelines and Performance Requirements

Design guidelines and performance requirements can be applied in concert with one another to support urban sustainability goals or other stated objectives. For example, guidelines are often issued by municipalities to encourage a specific type of building design, providing instruction on materials and equipment that maximize energy efficiency. Meanwhile, performance requirements provide criteria on how a building should ideally function (such as setting a cap on carbon emissions) and leaves it up to the architect to execute according to that standard.

The City of Toronto provides a relevant example of having created design guidelines in response to a rapidly changing skyline.[91] *Toronto Downtown Tall Buildings: Vision and Supplementary Design Guidelines* is intended to protect sky view and access to sunlight by providing instruction on:

- A building's angular planes;
- The minimum distance between structures; and
- The building envelope, including height limits and setbacks.[92]

These guidelines are further supported by a performance requirement that prevents structures from negatively impacting historic properties, parks, and views of certain landmarks and landscapes. Additionally, the requirements prevent tall buildings from casting new shadows on specific parks during certain days and times of the year.[93]

Similar steps have been taken by the New York City Department of Design and Construction to provide instruction to those involved in the design process. Documents such as *Sustainable New York* (2009) and *High Performance Building Guidelines* (1999) encourage tree canopy, access to direct and indirect sunlight, and acknowledge the importance of designing for different weather patterns and positions of the sun.[9495] However, these guidelines focus heavily on buildings themselves and fall short on providing directive for designing sunlight access in the public realm.

In addition to building-specific guidelines, the City and local nonprofits have issued public realm guidelines that reflect various degrees of focus on sunlight. For example, the Center for Active Design's *NYC Active Design Guidelines* asks designers to be mindful of seasonal changes and the presence of the sun when designing bus shelters, parks, and other outdoor areas.[96] Similarly, NYC Parks' *2010 High Performance Landscape Guidelines* contains several best practices for designing parks with sunlight, including:

- The placement of benches and water features in relation to sunny and shady areas to extend park use over seasons;
- Site planning that responds to the microclimate created by surrounding

structures, including those that block the sun's rays;

- Analysis of sun and shadow patterns to inform how a site is programmed; and

- Park layouts that preserve views from nearby buildings and sun access in adjacent open spaces.

Unfortunately, the guidelines only apply to capital projects led by NYC Parks. The City can do more to educate and promote best practices so the built environment and public realm evolve in harmony with one another. The following approaches should be considered for further study:

Expand building design guidelines and performance requirements for New York City

All too often, buildings and the spaces around them are designed independently from one another. This siloed approach overlooks cumulative effects, such as shadow impacts and view obstructions, that can occur when new development does not consider its surroundings. Building design guidelines have the potential to encourage development that is contextual while also supporting healthy, sunlit public spaces.

Existing building design guidelines for New York City could be expanded upon to more explicitly delineate desired building elements that promote sunlight and ensure that it reaches the public realm. For example, they could include additional criteria for shaping a building's envelope as a supplement to existing zoning and building codes, as well as performance-based requirements (such as a guideline that specifies the maximum shadow allowable on surrounding parcels).

Expand urban design guidelines for New York City

Urban design guidelines have the potential to enhance protections for sunlight and foster healthy, vibrant public spaces. If applied in conjunction with building design guidelines, a mutually supportive system for shaping development and the public realm can be established.

As mentioned earlier, the *2010 High Performance Landscape Guidelines* provides a strong foundation for a set of guidelines that can be applied to sidewalks, plazas, and other public and private spaces beyond the purview of NYC Parks.[97] This would ensure that all those responsible for designing and managing the public realm are working from the same set of criteria.

"Solar Carve"

One of the world's best examples of building design that prioritizes access to sunlight and air is Studio Gang's new office building at 40 Tenth Avenue in New York City's Meatpacking District. Known as the "Solar Carve," the east-facing rear of the building directly abuts the High Line, where development is rapidly shadowing the natural features of the park. Had the building been constructed as-of-right, the massing would have cast significant shadow on the sensitive vegetation of the High Line's Washington Grasslands and Woodland Edge. To avoid this outcome, Studio Gang used a variety of height and bulk zoning variances to address unique site conditions and adopted a practice of solar carving, by which the building's form was manipulated based on the sun's pathways. It is important to reiterate that the variances were extra steps the developer had to take, adding substantially to the timeframe and budget for the project, as existing City regulations did not allow for such a building design. The end result is a structure that appears to bend back from the sun's rays and allows the maximum amount of solar energy to reach the vegetation of the High Line.[115]

Solar Carve at 40 Tenth Avenue in Manhattan (Source: ©Tom Harris_008)

Design guidelines not only influence the shape and form of the public realm but seek to improve how individuals experience these spaces. New York's public spaces serve a variety of users and uses, whether it be for a soccer game, family gathering, or lunch break. Given the range of activities and fluctuation in time spent outdoors, design guidelines should respond to a diversity of needs. Movable chairs found in public spaces across New York City and popularized by the urban thinker William "Holly" Whyte are just one example of how design can facilitate multiple uses.

Incentives

Incentives are used to entice developers into making decisions that advance specific public benefit goals, such as increasing open space or providing a grocery store. When applied successfully, incentives can set a new course for real estate development that is responsive to its surroundings.

There are many examples of how incentive systems can effectively encourage development that maximizes sunlight access. For example, Singapore launched a Green Mark Scheme rating system in 2005.[98] Administered by the Singaporean Building and Construction Authority, the Scheme benefits developers who obtain accreditation for implementing environmentally sustainable building practices.[99] Along with milestones in other categories, accreditation requires achieving specific benchmarks relating to sunlight that assess:

- The amount of direct daylight received in a building's interior, and how this light reverberates off internal reflective surfaces; and

- The reflection created by a building's exterior based on its materials and surface angles.[100]

Developers that meet the two highest levels of Green Mark standards are allowed additional floor area based on land value. For centrally located projects with high land values, the amount of incentivized floor area is less than similar projects located in suburban areas.[101] This approach ensures that density is distributed throughout the island.

Several green building standards and certification systems have been used successfully to incentivize universal best practices for designing buildings with sunlight in mind. Some of the best examples are LEED™, the Fitwel Standard®, and WELL Building Standard™.

LEED™ is the most widely used green building rating system in the world. Administered by Green Business Certification Inc. (GBCI), LEED™ certification is globally recognized as a symbol of sustainability achievement.[102] Its standards can be applied to a wide variety of building types and phases, including construction, interiors, operations, and maintenance. LEED™ can also be used on a neighborhood development level, for new projects involving residential, non-residential, and mixed-use development.

The Fitwel Standard®, developed by the Centers for Disease Control and the General Services Administration, applies to a variety of building types, including retail, multi-family residential, and commercial workplace. Certification addresses wellness in the design,

The Interlace in Singapore (Source: Flickr, The Commons, Choo Yut Shing)

development, and operations of buildings. It integrates best scientific strategies for improving the health of workers, residents, and the surrounding community.

The Well Building Standard™, created by the International WELL Building Institute and also administered by GBCI, is one of the premier global standards for buildings, interior spaces, and communities seeking to implement building and design practices that support and advance human health.

These standards and certifications have largely been developed by the private sector and are not mandated. Below is a sample of incentives to study as part of the effort to curb shadows that impact New York City.[103]

Award increased FAR for designs that modify a building's massing and materials to prevent excessive shadow

The City may be able to amend the criteria for awarding FAR to ensure public access to sunlight. The City already does this for other public benefits, such as the construction of supermarkets and open space. Instead of granting increased FAR as-of-right, buildings could receive additional height and bulk by passing a performance review for shadow impacts.

Fast track the building permit process based on criteria for preserving sunlight in adjacent areas

Expediting the timeline for securing a building permit could reduce expenditures incurred by the developer at minimal or no cost to the City. In addition to fast tracking, discounted or waived building permit fees could be offered for buildings with minimal shadow impacts.

Provide tax abatements for new developments with shadow impacts below a certain threshold

At the state level, providing a tax abatement could encourage developers to construct buildings with minimal shadow impacts in exchange for a reduction in their property taxes. When applied in conjunction with available tax reduction programs for green roofs and solar panels,[104] a tax abatement for facilitating sunlight access would support New York State's aim of becoming carbon neutral.[105]

Provide grants for green space and infrastructure at the street level

Developers who preserve sunlit areas on their property could become eligible for newly established grants that cover the cost of landscaping and green infrastructure. Similar programs such as Philadelphia's stormwater grants provide a model for New York City.[106] This program encourages stormwater retrofit projects on non-residential properties by covering a portion or all of the associated costs.

Establish a sunlight rating system

A new sunlight rating system could be established or incorporated into existing green building certification programs like LEED™. Developers could earn a certain number of "points" for building designs that are sensitive to sunlight, vegetation, and other elements of the public realm.

Offer free training for mitigating shadow impacts

Another option is for the City or an independent organization to offer free training for ArcGIS, AutoCAD, and other shadow modeling software to assist in mitigating shadow impacts. This could be accomplished through a certification training or tutorials for developers and architects who are unfamiliar with the available tools.

Administration & Coordination

Several major cities across the globe have elevated the public realm and design decision-making in local municipal structures. Boston, for example, has a Public Realm Director who works with the City's Streets

Cabinet to implement people-oriented interventions on streets and sidewalks.[107] Their work is informed by Boston's Tactical Public Realm Guidelines, which provide guidance on coordinated efforts by the City and community members to create plazas, parklets, sidewalk cafes, and street murals in underutilized public space and in areas reclaimed from vehicle infrastructure. The guidelines do not explicitly address the issue of sunlight, however.[108]

Palacio de Bellas Artes in Mexico City (Source: Wikimedia Commons, Carolina López)

Mexico City has also had a department with a similar function. The City's Public Space Authority (known by its Spanish acronym, AEP) was created to improve the quality of urban life and reduce social inequality through the use of public space. The department recognized public space as infrastructure, and its interventions ranged from the creation of small pocket parks to larger parks and multi-block streets projects.[109] AEP was not responsible for maintaining these spaces, however, and did not have a specific mandate to protect sunlight.

In 2018, Los Angeles Mayor Eric Garcetti appointed a Chief Design Officer tasked with improving civic architecture and urban design, factors that are often overlooked in booming cities. The position is housed within the Office of Economic Development, further supporting the fact that the competitiveness of cities in attracting workers, residents, and visitors is tied to a high-quality public realm.[110] Though not formalized in official positions, the mayors of Paris and other cities are also making concerted efforts to elevate public realm considerations in their planning policy.[111]

In order to most effectively implement the aforementioned regulations, guidelines, and incentives, a new level of leadership may be needed in New York City. To accomplish this, the City could:

Establish a Director of the Public Realm

In New York City, there are many governmental agencies with responsibilities that affect the public realm. For example, the Department of City Planning directs types and forms of development, NYC Parks manages open space and recreational resources, and the Department of Transportation maintains streets, sidewalks, and plazas. Yet no agency has sole responsibility for governing all these components that comprise the public realm, not to mention access to sunlight.

The Director of the Public Realm position could be established as part of a new or existing branch of government. The position would require awareness of public health, planning, environmental, socioeconomic, and other cross-disciplinary issues that span multiple agencies, with a focus on the importance of sunlight in fostering a healthy, livable city.

For instance, the director could lead and implement public realm design and development across multiple City departments and could also convene a Public Realm Cabinet comprising members of each agency that influences the public realm. The City of Seattle has a Capital Cabinet that functions in this capacity to guide planning and implementation of infrastructure investments.[112] As a steward of all public space, the director could help ensure that professionals base their work on a specific set

of guidelines that incentivize the protection of sunlight. They could also lead the creation of an overarching public realm plan for the city, similar to Boston's guidelines.

Conduct a baseline assessment and establish benchmarks

In its most basic form, a baseline assessment provides a snapshot of a community's resources, establishing a starting point for setting goals and measuring progress towards benchmarks. This type of research is most useful when analyzed in coordination with other data layers, such as neighborhood demographics, health, and equity factors that may help identify vulnerable systems and populations.

For example, in Portland, Oregon, the city's Bureau of Planning and Sustainability conducted an analysis and planning framework to inform their strategic plan, the *Portland Plan*, and their *2035 Comprehensive Plan*. The 20-minute neighborhood index was developed to measure access to community amenities and infrastructure like parks, transit, public schools, and grocery stores. By combining these factors into one map, the City was able to assess how relatively well-served neighborhoods are and identify a threshold measure for what they defined as "complete communities." Based on the citywide assessment that 45 percent of Portlanders live in a complete neighborhood, the City set a target to have 80 percent of Portlanders living within complete communities by 2035. To accomplish this, the City developed a growth and investment strategy to accommodate population growth, fill service gaps, and reduce disparities by targeting infrastructure investments in neighborhoods with underserved and underrepresented populations.[113]

New York City's street tree censuses—completed in 1995, 2006, and 2016—also provide precedent for the creation of a baseline assessment for sunlight. This effort captured information on the attributes of trees (such as species, size, and health), quantified the benefits observed, and identified areas where additional trees could be planted. In its most recent effort, thousands of volunteers mapped more than 600,000 street trees. This inventory and assessment utilized geospatial technology to create an accurate picture of the city's urban forest and facilitated a data-driven management system that supports the agency's short- and long-term operations.[114] While advanced shadow modeling need not involve such a crowd-intensive process, a similar output is needed for sunlight access in the public realm that can then be verified in the field.

A baseline assessment would allow for a more expansive picture of existing sunlight and shadow conditions than is offered through New York City's current environmental review process, which does not consider streets, sidewalks, and open space created by proposed development to be sunlight-sensitive resources. A baseline analysis could inform performance benchmarks for these public spaces, which are heavily affected by the presence or lack of sunlight.

Source: NY4P

CALL TO ACTION

Several steps can be taken immediately to advance Fight for Light:

1. **Designate and resource a City-level advocate.** Appoint a Director of the Public Realm and resource the position with the staff and budget to monitor, plan, and invest in the city's public realm.
2. **Conduct a baseline assessment and establish goals.** Undertake an assessment to refine policies and set goals for access to sunlight, formulate a Public Realm Plan, and inform policy recommendations related to economic development, climate, land use, and environmental protection.
3. **Identify places and populations that are vulnerable.** Lead with health and equity in response to the needs of historically underrepresented communities with gaps in park access, low incomes, limited English proficiency, high concentrations of asthma or other health risks, and high youth and elder populations.
4. **Prioritize solutions that protect and enhance sunlight in the public realm.** Draft a set of policy proposals that are feasible and applicable within New York City's unique planning context.

These first critical steps are to engage and cultivate leadership to drive data-informed policy development, benchmarking, and implementation. Ultimately, Fight for Light will advance legislative and policy approaches through engagement with elected officials, community boards, impacted communities, developers, and other stakeholders.

Source: Flickr, The Commons, Jonathan Grado

CONCLUSION

In New York City, generations of activists have successfully shifted the City's approach to the urban environment by advocating for zoning changes, embracing new technology and analysis, and proactively responding to emerging challenges. Our public realm is inseparable from the health of our city and its residents. We must continue to steward and enhance access to light on our sidewalks and in our parks, plazas, gardens, and open spaces.

This fight is urgent. It is important to recognize that shadows and their consequences cannot be remedied by a cursory investment—we need proactive leadership and policies that safeguard our public realm well into the future. MAS and NY4P are united in creating a healthier, more livable city.

We believe it is critical to ensure access to sunlight now and in the future, to preserve the livability and quality of life for a dense and vibrant New York, and to prepare for a changing climate. We're united in drawing attention to the risks of incremental shadows, to highlight the potential of the sun to advance our vision for a well-functioning city, and to engage with all stakeholders for better planning.

We're in this fight for the people who rely on the public realm for their exercise, who view their local park as their back yard, and who extend the life of the city into the spaces between buildings. We are in this fight for the places where people are brought together, where ecological function and beauty come together to heal a stressed population, and where the history and character of the city can be celebrated.

We're championing change because we believe that access to sunlight is integral to our character, our communities, and our competitiveness. We believe that New York City can be a global leader, that we can identify and implement solutions with broad support, and that together we can affirm our right to sunlight.

Help us win. Help us Fight for Light.

Source: Flickr, The Commons, Mr. Nixter

GLOSSARY

Air rights or development rights
Development rights generally refer to the maximum amount of floor area permissible on a zoning lot. When the actual built floor area is less than the maximum permitted floor area, the difference is referred to as "unused development rights." Unused development rights are often described as "air rights."[116]

Building envelope
A building envelope is the maximum three-dimensional space on a zoning lot within which a structure can be built, as permitted by applicable height, setback, and yard controls.

Building massing
The volume and shape of a building or a group of buildings.[117]

Contextual zoning
Contextual zoning regulates the height and bulk of new buildings, their setback from the street line, and their width along the street frontage, to produce buildings that are consistent with existing neighborhood character.[118]

Rezoning
A rezoning or remapping occurs when the zoning designation(s) for an area is changed on the zoning map to facilitate policy initiatives, such as preserving neighborhoods and promoting economic development around transit hubs.[119]

Setback
A setback is the portion of a building that is set back above the base height (or street wall or perimeter wall) before the total height of the building is achieved. The position of a building setback in height factor districts is controlled by sky exposure planes and, in contextual districts, by specified distances from street walls.[120]

Solar radiation
Solar radiation is a general term for the electromagnetic radiation emitted by the sun. Solar radiation can be captured and turned into useful forms of energy, such as heat and electricity, using a variety of technologies. The amount of solar radiation that reaches any one spot on the Earth's surface varies according to geographic location, time of day, season, landscape, and weather.[121]

Special permit
A special permit is a discretionary action by the City Planning Commission (CPC), subject to Uniform Land Use Review Procedure (ULURP), or the Board of Standards and Appeals (BSA), which may modify use, bulk or parking regulations if certain conditions and findings specified in the Zoning Resolution are met. Applications for special permits under CPC jurisdiction generally concern use or bulk modifications with potential for greater land use impacts than those reviewed by the BSA.[122]

Variance
A variance is a discretionary action by the Board of Standards and Appeals which grants relief from the use and bulk provisions of the Zoning Resolution to the extent necessary to permit a reasonable or practical use of the land. A variance may be granted, after a public hearing, when unique conditions on a specific parcel of land would cause the property owner practical difficulty and undue hardship if it were developed pursuant to applicable provisions.[123]

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ABOUT THE MUNICIPAL ART SOCIETY

For more than 125 years, MAS has worked to educate and inspire New Yorkers to engage in the betterment of our city. As a nonprofit advocacy organization, MAS mobilizes diverse allies to focus on issues that affect our city from sidewalk to skyline. Through three core campaign areas, MAS protects New York's legacy spaces, encourages thoughtful planning and urban design, and fosters complete neighborhoods across the five boroughs.

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ABOUT NEW YORKERS FOR PARKS

NY4P conducts research and develops tangible policy recommendations around our findings related to park development, management and sustainability. This research becomes the foundation for our advocacy campaigns; NY4P drives both immediate actions and long-term policies that protect and enhance the city's vast network of parks, ensure adequate and equitable distribution of open space resources to all neighborhoods, and inform and empower communities throughout New York City to advocate for their open space needs. To support our efforts, NY4P builds and maintains strategic partnerships with government officials and agencies, local parks groups and conservancies, academic institutions, and other key stakeholders in the public and private sectors.

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FIGHT FOR LIGHT TASK FORCE

Fight for Light is guided by a Task Force of experts from many cities, sectors, and areas of focus, including the architecture, engineering, environmental justice, legal, planning, preservation, public health, and real estate professions. These experts have grounded the initiative in existing practice and theoretical research, provided guidance on New York City priorities, and helped to shape an exploratory set of future policy directions.

In June 2019, MAS and NY4P hosted a series of roundtable discussions in which Task Force members and experts from New York, Boston, London, Seattle, Toronto, Vancouver, and other cities gathered to discuss access to light in the built environment. These conversations generated numerous ideas for preserving and enhancing sunlight in New York City, many of which are incorporated in *Bright Ideas*.

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Bright Ideas: New York City's Fight for Light