

The New York City Climate Mobilization Act:

A Guide for Building Owners and Managers

08.2019

ONE OF THE MOST HISTORICALLY DISRUPTIVE LAWS FOR NYC'S REAL ESTATE MARKET CREATES STEEP FINANCIAL LOSSES FOR THOSE UNCERTAIN OF HOW TO RESPOND.

Announced on Earth Day 2019, the New York City Climate Mobilization Act (CMA) is a package of local laws that includes a first-of-its-kind building emissions law.

Posing a major disruption to the city's real estate market, this legislation creates a mix of opportunities and risks to address. Given the hefty fines associated with noncompliance, building owners and managers are under pressure to understand these new requirements and what actions they must take to comply.



This guide will address your most pressing questions about the NYC Climate Mobilization Act, including:

- How will the new laws impact my building?
- How much could I be fined and when?
- When should I start thinking about compliance?
- What will I need to do to meet my building's reduction targets?
- What upgrades will I need to make to my building and how am I going to pay for it?

Contents

The Basics

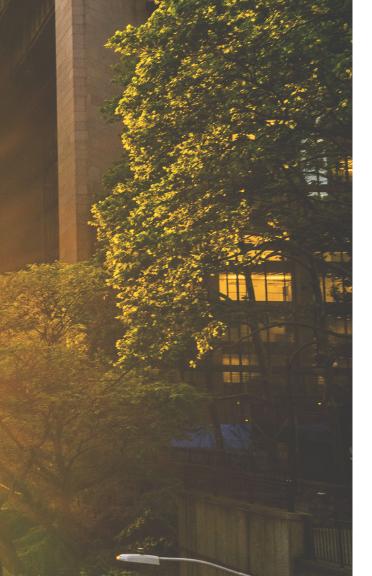
CMA Overview	
Expected Impacts	
The CMA in Context	
Deep Dive	
Overview of Local Law 97	16
Impacted Buildings	18
Reporting Requirements	19
Timing	20
Planning Complexities	22
Enforcement & Fines	
Alternative Paths to Compliance	76

Take Action

Building Owner Blueprint for LL97 Compliance	30
Step 1: Measure	32
Step 2: Assess	
Step 3: Plan	38
Appendix	
About Us	42
Sources	4

"We must act together and lead the world by example. Our city, and indeed our planet, requires nothing less."

Mayor Bill DiBlasio



The Basics

What building owners need to know about NYC's Climate Mobilization Act and Local Law 97.



The New York City Climate Mobilization Act is a package of five local laws aimed at aligning NYC's climate strategy with the targets established in the Paris Climate Agreement and the Mayor's '80x50' initiative. Of these laws, the most important for building owners to understand is Local Law 97 of 2019 (LL97), which requires the majority of medium-to-large building in NYC to begin reporting their greenhouse gas emissions to the city and reducing emissions to prescribed targets by the end of 2024.

Local Laws 92 & 94

Require green roofs and rooftop solar on certain buildings.

Local Law 95

Updates existing metrics for energy efficiency grades on buildings that launch in 2020.

Local Law 96

Establishes a Property Assessed Clean Energy. or 'PACE' program for sustainable energy loans.

Local Law 97

The CMA's 'centerpiece' legislation which sets strict emissions limits on covered buildings and mandates steep fines for buildings that fail to meet their reduction target.

Expected Impacts

How will the laws impact New York City?

By 2030, the Climate Mobilization Act is projected to have the following impacts:

10% Reduction

over all NYC's emissions

6 MM Tons

of greenhouse gas emissions eliminated equivalent to:

1.3 MM Cars

removed from the road

26,700

green jobs creation

60 to 130

prevented premature deaths

150 Hospital

visits prevented annually

Fact: New York City has long served as a launchpad for disruptive industry changes that favor social well-being, including:

- Worker health and safety laws
- Trash collection and public sanitation
- Ban on indoor smoking

Though initially controversial, these laws—and the societal benefits they produce—tend to spread rapidly, eventually becoming the legal norm across the U.S.

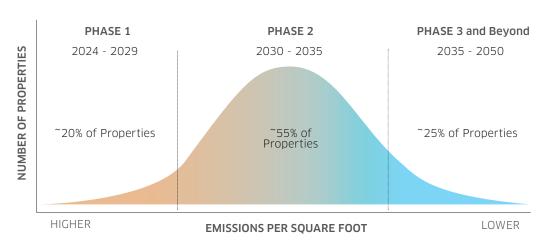
Source: Mayor's Office of Sustainability

How will the laws impact building owners?

The CMA's centerpiece, Local Law 97, will impact building owners significantly by mandating steep emissions reductions measures throughout the majority of NYC's building space and heavy fines for buildings that don't comply. The law's approach is unique because it targets the least efficient buildings first and imposes stricter requirements over time.

Fact: Buildings are responsible for two-thirds of NYC's annual emissions

LL97 Impacts Over Time



This graph is meant as a conceptual aid and does not represent actual properties or emissions limits.

All buildings covered by LL97 will need to begin reporting their emissions beginning in 2024 (reports due May 2025), but the law is designed so that only the 20% with most emissions-intensive buildings will require upgrades or face fines in phase one.

Phase two gets much stricter, and the majority of covered buildings will face fines if reductions aren't made by before 2030 begins.

The CMA in Context

The CMA and its historic building emissions law are indicative of a broader push for improved sustainability. There are several related local and state initiatives that building owners should be aware of:

New York City

Greener Greater Buildings Plan

Consists of four energy benchmarking & reporting laws, including the requirement for large commercial buildings to benchmark and disclose energy usage information.

• 80x50

Refers to NYC's commitment to achieving an 80% reduction in greenhouse gas emissions by 2050, with an interim target to reduce emissions 40% by 2030 (40x30).

OneNYC

NYC's comprehensive and ambitious strategic plan for a more sustainable, resilient, and socially equitable city.

New York State

• Clean Energy Standard

An enforceable mandate adopted in 2016 that

requires 50% of New York State's electricity to come from renewable energy by 2030.

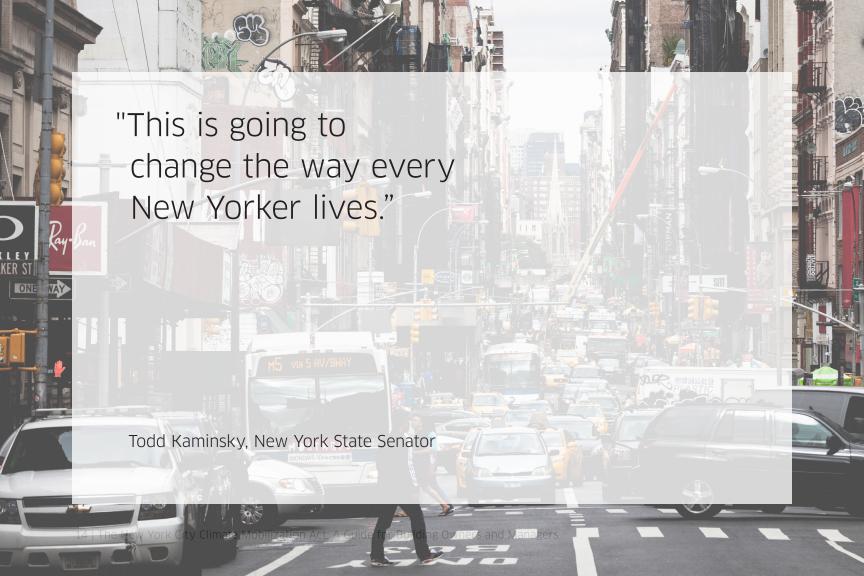
• REV NY

New York State's energy strategy, 'Reforming the Energy Vision', seeks to transform New York State's energy grid to resilient, clean, and locally produced power through policy and infrastructure initiatives.

 Climate Leadership and Community Protection Act

A set of bills passed by the state senate in June of 2019 with similar goals to NYC's Climate Mobilization Act. The CLCPA mandates net zero emissions be achieved statewide by 2050, with an interim target of a 40% reduction by 2030.

See page 47: **Appendix/Resources** for links





Deep Dive

Everything building owners should know about NYC's Local Law 97.

The centerpiece of the Climate Mobilization Act, Local Law 97, establishes new limits on greenhouse gas emissions for large buildings based on the city's 80x50 reduction goals.

Overview of Local Law 97



Impacted Buildings

Affects most large, privately owned buildings.



Planning Complexities

Greenhouse gas management is complex in NYC.



Reporting Requirements

Limits greenhouse gas emissions, not energy consumption.



Fines & Enforcement

Strict penalties will be levied for non-compliance.



Timing

Emissions caps are assigned in phases and will get increasingly stringent through 2050.



Alternative Paths to Compliance

Some alternative paths to compliance are available.

Impacted buildings

Affects most large, privately owned buildings.

Local Law 97 sets emissions caps for NYC buildings 25,000 square feet and larger, or two or more buildings on the same tax lot (BBL) together exceeding 50,000 square feet.

The law applies to approximately **50,000 buildings** across NYC, covering **22,000 properties**, and 60% of the city's total building area.

Of the **3.15 million sq. ft** of building area covered, 59% is residential and 41% is commercial space.

Source: Mayor's Office of Sustainability

Tip: If you're required to report annual energy and water use under NYC LL84, chances are high that your building will also be subject to LL97.

Which buildings are excluded from LL97?

- City-owned buildings have an earlier timeline for emissions reduction and are not included in LL97
- Prescriptive path requiring energy savings measures only for houses of worship, rent-controlled, low-income and subsidized housing
- Adjustments available for some hospitals
 and medical facilities

Reporting Requirements

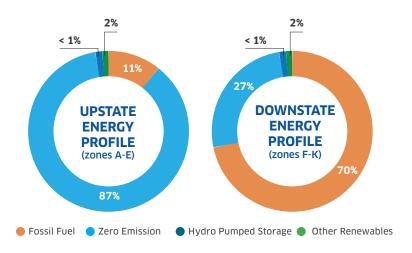
Limits greenhouse gas emissions, not energy consumption.

Unlike most building efficiency legislation, LL97 limits greenhouse gas emissions at large buildings, rather than just energy.

While a building's energy consumption and emissions are closely linked, the City's decision to apply an emissions-based standard creates an additional layer of complexity for building owners.

Since building emissions change as the grid changes, a building owner's ability to comply with the increasingly strict reduction targets outlined in LL97 are on New York City's electric grid becoming much cleaner in the future.

Upstate vs. Downstate Energy Profile



Fact: Although a large percentage of the energy generated in New York State is emission-free, constraints in transmission limit how much clean energy makes it downstate to New York City.

See page 47: Appendix/Resources for source

Timing

Emissions caps are assigned in phases, and will get increasingly stringent through 2050.

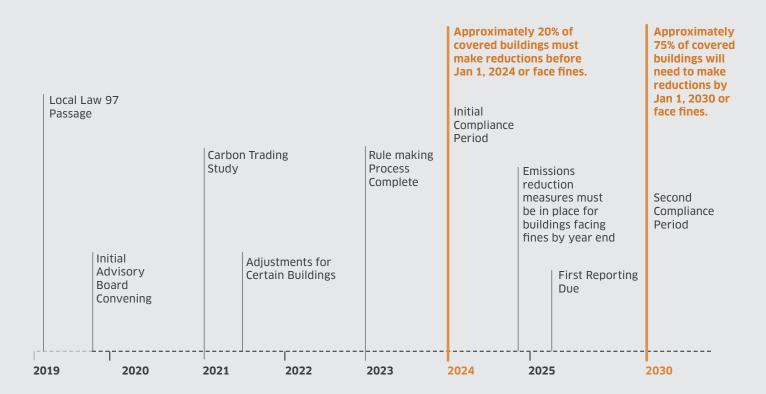
The compliance period begins January 1, 2024. It is projected that 20% of covered buildings will need to make reductions in order to comply with these initial limits.

- Increasingly stringent caps will be deployed in phases beginning in 2030, 2035, and 2040.
- The 2030 2034 target is designed to align buildings with the city's 40x30 climate goals.
- Emissions limits for 2035 and beyond are yet to be established by the Department of Buildings, but must be published by January 1, 2023 according to the law.

Buildings may qualify for an emissions limit adjustment in the following circumstances:

- Capital improvements not possible due to outside constraints. For example, historic preservation laws or space constraints may limit the upgrades that can be made to some buildings.
- Capital improvements not possible due to financial hardship, defined by the application of tax liens or property tax exemptions. If granted, this adjustment is only valid up to one year.
- Excess emissions are attributable to special use cases. For example, a building with 24-hour operations, high density occupancy, or energy-intensive equipment may not be able to achieve its reduction targets while maintaining reliable operations.

Compliance Timeline



Planning Complexities

Greenhouse gas management is complex in NYC.

In order for building owners to measure and manage their emissions, they must calculate the global warming potential of all of their fuel sources, which can vary widely. The currently high emissions intensity of electricity reflects downstate New York's current transmission capacity and renewable energy resources. However, if New York State's clean energy goals are realized on target, the the emissions 'cost' of grid-based electricity may reduce drastically as LL97 restrictions tighten.

Relative emissions coefficients by fuel source

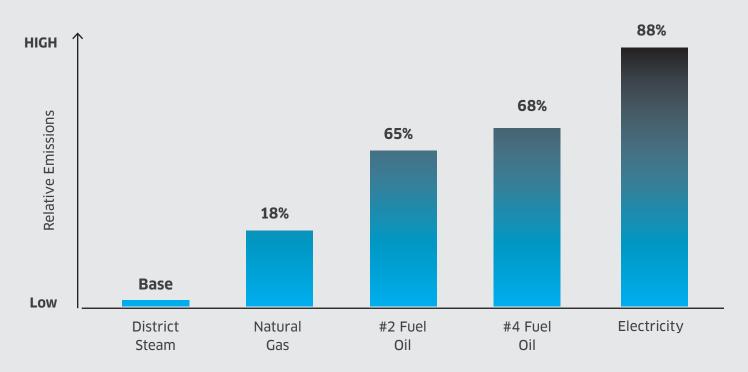
While the 80x50 strategy tends to favor switching to electricity from the grid over other fossil fuel sources, this is currently the most emissions-intensive energy option for New York City building owners.

Given the way LL97 and the Mayor's 80x50 strategy is structured, building owners have several complex situational factors to consider when designing a strategy for long-term compliance, including:

- Retiring emissions-free nuclear resources
- Uncertain availability of natural gas and political unpopularity of future pipelines
- New York State's stated goals to increase downstate renewable energy generation and transmission capacity
- Future feasibility of alternative compliance options, including offsets, RECs and DERs

Relative Emissions Coefficients by Fuel Source

Global warming potential of fuel sources varies widely and can change over time. For example, when renewable energy is added to the power grid, the emissions "cost" of electricity goes down.



Fines & Enforcement

Strict penalties will be levied for non-compliance.

Covered buildings must submit a compliance report by May 1, 2025 and every May thereafter.

Fees:

- Failure to file a report: \$.50 per building square foot, per month
- Exceeding emissions limit: \$268 for each metric ton over the building's limit
- False statement (misdemeanor) \$500,000

Fact: The law states that buildings' annual GHG emissions reports must be prepared by a registered architect or engineer

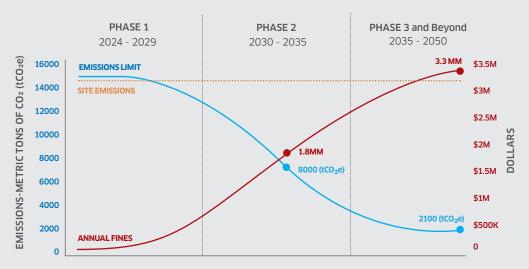
A new Department of Buildings (DOB) will oversee Local Law 97's implementation and enforcement.

The law mandates that an Office of Building Energy and Emissions Performance be established under the city's Department of Buildings. The duties of the office will include:

- Overseeing implementation of building energy and emissions performance laws
- Reviewing annual building emissions assessments;
 Auditing building emissions assessments and inspecting buildings as necessary
- Determining penalties for buildings that are noncompliant with applicable emissions limits
- Reviewing applications for adjustments and deductions

An Example of Fines Due to Inaction: 45-Story Office Tower

Like most buildings impacted by LL97, this 45-story office building will not likely need to make any changes to avoid fines in 2024. However, major efficiency and equipment upgrades are needed for this building to avoid hefty fines starting in 2029. If this building owner were to make no changes, their fines would amount to more than half the building's current energy costs by 2035.



Example for illustrative purposes only. See page 32 for more details on how to calculate your building's emissions limit and potential fines.



Size: 1,793,000 sq. ft.

Year Built: 1987

Property Type:
Business (Group B)

Annual Energy Cost: **\$6.4MM**

Annual tCO₂ Emissions: 14,830 Metric tons

Projected Fines 2024-2029: \$0 2030-2034: \$1.8 MM

2035-2050: \$3.3 MM

Alternative paths to compliance

Some alternative paths to compliance are available.

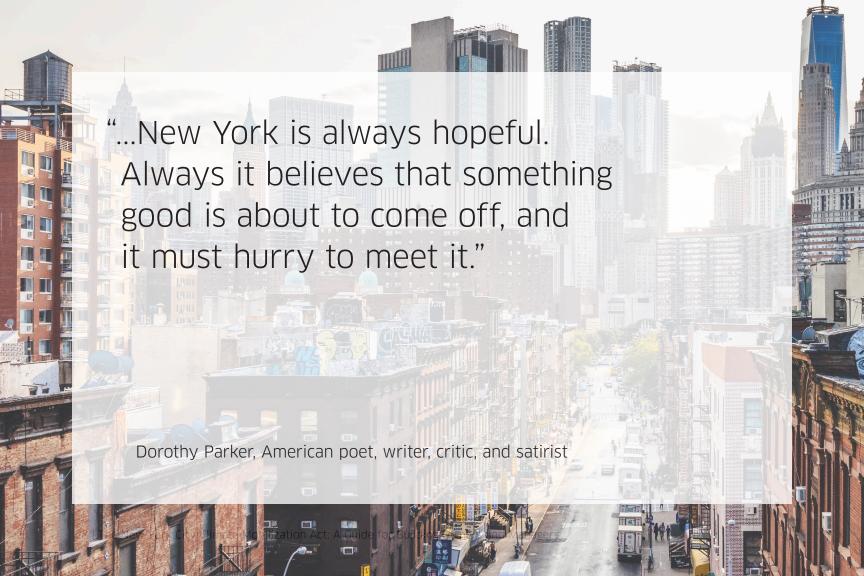
Local Law 97 stipulates three additional paths to compliance for building owners unable to meet their emissions targets through building upgrades alone.

Deductions from reported annual emissions may be granted for:

 Greenhouse Gas Offsets. Up to 10% of a building's annual emissions limit can be deducted through the purchase of greenhouse gas offsets. LL97 also mandates that the City study the development of a citywide emissions trading scheme focused on greenhouse gas emissions from buildings by 2021.

- Renewable Energy Credits (RECs). Unlimited RECs may be purchased in lieu of reductions. However, RECs must represent energy that is deliverable to the NYC area and must be generated in the same year as the building emissions for which they are compensating. As of June 2019, no qualifying renewable energy projects exist that meet these requirements.
- Distributed Energy Resources (DERs). Deductions will be granted based on the output of DERs directly connected to the building in question. Eligible DERs may either generate clean electricity (i.e. rooftop solar) or store electricity for use during peak demand periods.







Take Action

A Blueprint for Building Owners

To comply with Local Law 97, nearly every impacted building will need to complete a deep energy retrofit. Building owners are being pushed to increase electrification, while drastically improving efficiency of their heating and cooling infrastructure. Given the law's complexities, taking action now is key.

Even if your building is already meeting its 2024 emissions target, you should start developing a strategy for future compliance now. Building owners who start planning early will be less likely to experience costly problems or fines in the future when all large buildings in NYC are racing to reduce their emissions.

Building Owner Blueprint for LL97 Compliance



Step 1: Measure

Use energy benchmarking data to estimate your building's emissions targets and whether you may be subject to fines in 2025 and 2030.



Step 2: **Assess**

Review your building operations practices, equipment, and fuel sources to holistically evaluate and prioritize reduction strategies for short- and long-term compliance.



Step 3: Plan

Create a strategy for deploying operational changes, energy efficiency measures, deep retrofits. and DERs, while planning for longterm changes in the energy and alternative compliance markets.



Once you know your building is impacted by LL97, the first step you should take is to estimate your building's emissions target for 2024 and 2030, and whether your building could be subject to fines. Unfortunately, this is not as straightforward as understanding your building's energy usage, as there are several additional factors that go into this calculation.

Determine your building's GHG 'budget'

To calculate your LL97 emissions target, you'll first need to determine your building's 'occupancy code' under LL97. The occupancy code is key to determining your building's emissions target, because each building type is assigned a different emissions intensity limit under the law.

The table below specifies 2024 and 2030 emissions intensities for three of the most prevalent building types under LL97. Limits for the remaining occupancy groups are listed in the law.

Emissions Limits for Select Occupancy Groups

	2024 - 29 (Tons of C	2030 - 34 0 ₂ e per SF)
Occupancy Group R-2 (includes apartments)	.00675	.00407
Occupancy Group B (includes offices)	.00846	.00453
Occupancy Group R-1 (includes hotels)	.00987	.00526

Estimate your current emissions 'spend'

Once you know your building's assigned emissions 'budget' under LL97, you can determine whether vour building is operating within these limits or if further action will be required to avoid fines in 2024. 2030 and beyond.

Using your existing energy benchmarking data, you can calculate your building's carbon emissions by converting each type of energy used to its carbon emissions equivalency. Also referred to as 'emissions factor', this is a number that converts your building's energy use based on the global warming potential of the various fuel types its using.

Phase One Emissions Factors

GHG coefficients Energy Source	2024-2029 (Tons C0 ₂ e/kBtu)
Utility electricity (per kWh)	.000288962
Natural gas combusted on-site	0.00005311
#2 fuel oil combusted on-site	0.00007421
#4 fuel oil combusted on-site	0.00007529
District steam	0.00004493
Other, including distributed energy resources	TBD

Fact: GHG coefficients for 2030 and later, and emissions targets for 2035 and later, will be established by January 1, 2023.

Using your energy benchmarking information, the next step is to multiply the assigned emissions factor with your relative use for each type of fuel.

The table below represents an example calculation for the building highlighted on page 25.

Energy Source	Annual Use	Emissions (tCO ₂ e)	% of Total Emissions	% of Total Energy Consumed	Site Energy Costs	% of Total Energy Cost
Electricity	22,005,148 Kwhr	6,359	42.9%	30.2%	\$3,080,721	48.4%
Natural Gas	82,927,866 kBtu	4,404	29.7%	33.4%	\$681,423	10.4%
District Steam	90,526,601 kBtu	4,067	27.4%	36.4%	\$2,625,271	41.2%
#2 Fuel Oil	0 kBtu	-	0.0%	0.0%	\$-	0.0%
#4 Fuel Oil	0 kBtu	-	0.0%	0.0%	\$-	0.0%
Total	248,536,033 kBtu	14,830	100%	100%	\$8,295,683	100%

Estimate potential fines

Finally, once you know your building's emissions 'budget' and its current emissions 'spend', you can calculate your potential fines for 2024-2029 and beyond under LL97.

The law dictates a fine of \$268 per metric ton 'over budget' your building is starting in 2024. In the example used previously on page 25, this would equal approximately \$1.8 million beginning in 2030 if the building were to make no changes.

Period	Site Emissions (tCO ₂ e)	Site Emissions Limit (tCO ₂ e)	Violation (tCO ₂ e)	Total Annual Fine
2024-2029	14,830	15,169	-	-
2030-2034	14,830	8,116	6,708	\$1,797,750
2035-2050	14,830	2,510	12,320	\$3,301,790



Once you know your deduction targets over the next two compliance phases of LL97, you can begin to evaluate your options for reducing your building's emissions in the near future and as part of your long-term compliance strategy.

Using your emissions estimate, the next step is to unpack what operational changes, efficiency measures and retrofits might be needed. Also, what resources are available to finance these changes?

The following are broad areas of intervention that most building owners will need to consider as part of their long-term LL97 strategy. These measures will be key ingredients for developing a comprehensive plan for compliance throughout each phase of the law's implementation.

In addition to understanding your options for reducing emissions in your building, it's also important to assess your organization's capacity to fund and manage the projects those measures would entail.

Short term

- Operational changes
- Efficiency measures

Medium to long-term

- Deep Retrofits
- DERs
- Offsets

Always

- Adjustments and deductions as necessary
- Other financing options

A comprehensive LL97 strategy should include proactive financing strategies that fully leverage all available programs, such as PACE, utility incentives, and more innovative financing and ownership models.

Your building's LL97 compliance plan should also take into consideration other key factors impacting timing of these measures, including:

- Tenant turnover and vacancy periods
- Equipment replacement schedule
- Uncertainty around certain aspects of LL97, such as the treatment of DERs and CHP

Unfortunately these factors are not always complimentarily aligned, which can create difficult choices for building owners.



LL97 was designed to give building owners time to form a holistic, long-term plan for their individual buildings. The law is designed to create economies of scale by placing a heavy burden on building owners to innovate far beyond what today's infrastructure technology can currently support.

While the full picture of solutions and options for building owners is still developing, this guide concludes with six key recommendations for building owners to begin formulating an informed compliance plan and developing the capabilities required to adapt as LL97's implementation progresses.

Use Time to Your Advantage.

The phased roll-out of LL97 creates an opportunity for proactive building owners to use time to their advantage. While major upgrades may be able to wait, building owners should start seeking the guidance they require for compliance now, to begin formulating a long-term compliance strategy that accounts for the many complexities surrounding the law.

Building owners who act early are less likely to encounter potential future issues like labor shortages, or be caught off guard by changes to the power mix or grid infrastructure. Early actors will also be far better positioned to leverage more creative financing and ownership models and find innovative ways to reduce their financial exposure to the challenges posed by LL97.

Grow Your Emissions Management Expertise.

LL97 requires building owners to get serious about managing emissions, making it part of 'business-as-usual' like managing tenant vacancy or safety compliance. Building owners will have no choice but to develop these new capabilities and competencies within their organization, or invest in long-term partnerships with qualified third-party vendors.

Keep an Eye on the Power Grid, and Expect Energy Prices To Rise.

As this guide has discussed, LL97 was designed with the assumption that New York's grid will undergo a transition toward renewable energy over the coming decades. If the state's plans fall short, building owners are at risk of facing fines if electricity emissions factor does not decline as planned. Furthermore, the ambitious nature of New York's grid overhaul has many building owners justifiably concerned about how these changes will impact electricity prices, quality and reliability.

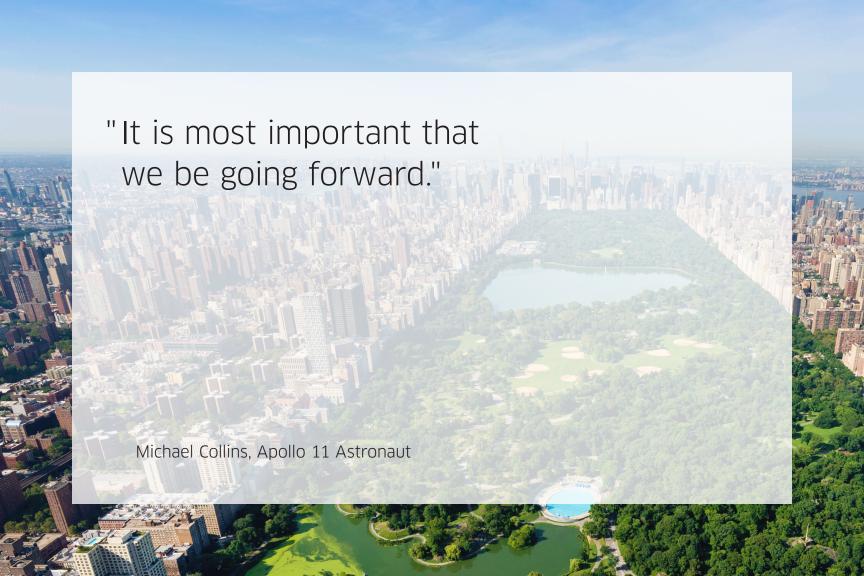
Consider Flexible Financing and Ownership Models.

LL97 presents an opportunity for building owners to think differently about how they monetize their building assets over time. While the PACE program and other effective market measures are being put in place to address basic financing for building upgrades, building owners wishing to explore more innovative solutions should look at on-bill financing and alternative ownership models.

Find a Partner You Trust.

LL97 demands a holistic approach to emissions reduction through innovative building and requires of different areas of expertise to collaborate to design solutions that push building efficiency far beyond what is currently possible.

A company able to handle all of this is hard to come by. Possibly there's no company aside from ENGIE that is positioned to handle such an array of building owner needs related to NYC's Climate Mobilization Act and building emissions law.





Appendix



About Us

ENGIE Services is the leader in delivering a complete suite of sustainable, lifecycle building services and integrated facility programs that help education, government, commercial and industrial customers become more efficient, productive and sustainable. Over the past 44+ years, thousands of our customers have captured more than \$2.8 billion in savings, while also improving their performance in terms of reliability, safety, comfort and resource use.

Work with one connected team that provides truly cross-functional expertise in everything building and energy-related and is committed to delivering long-term, holistic care for your properties and assets. The outcome is a more efficient and effective way of owning and operating a compliant building in New York and contributing to the decarbonization of the planet.

As part of the #1 energy services provider in the world, we provide an extensive set of energy and sustainability management services to thousands of customers throughout the United States.

Six Advantages of Working with ENGIE Services

Exceptional results with one provider.

1. Performance Certainty

Full accountability for outcomes with less exposure to risk

2. Better ROI

Lower life cycle costs with higher investment returns

3. Turnkey and Comprehensive Service

A single source of responsibility from conception to completion and operation

4. Transformative Impact

Tangible, sustainable results

5. Superior Customer

Experience skilled professionals use well-honed processes to deliver peace of mind

6. Global Leadership

ENGIE is the #1 energy services provider in the world

Our comprehensive suite of in-house building services, facility modernization, and energy infrastructure solutions can stand alone or integrate for greater impact. We work with you to customize and combine solutions into an ideal program that improves building and environmental performance, lowers costs, and reduces exposure to risk.

Controls & Automation

Design and installation of "smart" building technologies including fire-life-safety, security, and building management systems.

Design & Construction of Mechanical Electrical, & IT Infrastructure

Turnkey, single-source accountability for developing, engineering, and installing equipment and systems

Economic & Environmental Performance

Holistic thinking and actions to optimize building systems to be more efficient, productive, and sustainable.

Education & Community Engagement Programs

Training and facilitation that connects energy systems with human-centered activities to enable learning and technology adoption.

Energy Cost & Usage Management

Energy efficiency, energy waste reduction, and optimized energy consumption.

Energy Storage & Microgrids

Advanced technologies and resiliency solutions that enable reliable, self-sufficient operations.

Modernization & Energy Infrastructure Optimization

Retrofit and replacement of outdated, outmoded energy, mechanical, and electrical systems.

Finance & Funding

Financial solutions to minimize upfront capital investment, limit balance sheet impact, increase cash flow, and shift economic risk.

Monitoring, Reporting, & Benchmarking

Continuous monitoring and management that tracks building systems, utility usage, and equipment performance in real-time. Remote analytics resolve issues before they escalate into larger operational or financial problems.

On-site Generation & Renewables

Sustainable solar and cogenerated power.

Operations, Maintenance, Repair & Life Cycle Management

Facilities management, systems maintenance, and equipment repair for optimum asset performance and longevity.

Resources

Page 9

Local Law 92 of 2019, www1.nyc.gov/assets/buildings/local_laws/ll92of2019.pdf.

Local Law 94 of 2019, www1.nyc.gov/assets/buildings/local_laws/ll94of2019.pdf.

Local Law 95 of 2019, www1.nyc.gov/assets/buildings/local_laws/ll95of2019.pdf.

Local Law 96 of 2019, www1.nyc.gov/assets/cchr/downloads/pdf/amendments/Local_Law_96.pdf.

Local Law 97 of 2019, www1.nyc.gov/assets/buildings/local_laws/ll97of2019.pdf.

Page 10 and 18

NYC Mayor's Office of Sustainability, "Climate Mobilization Act Briefing," Building Energy Exchange, May 22, 2019, www.be-exchange.org/climate-mobilization-act-briefing/.

Page 12-13

City of New York, "Greener Greater Buildings Plan," www1.nyc.gov/html/gbee/html/plan/plan.shtml.

NYC Mayor's Office of Sustainability, "New York City's Roadmap to 80 x 50," www1.nyc.gov/assets/sustainability/downloads/pdf/publications/New%20York%20City's%20Roadmap%20to%2080%20x%2050_20160926_FOR%20WEB.pdf.

City of New York, "OneNYC," www.onenyc.cityofnewyork.us.

NYSERDA, "New York Clean Energy Standard," www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Standard.

New York State, "Reforming the Energy Vision," www.rev.ny.gov

New York State, "Climate Leadership and Community Protection Act," www.nysenate.gov/legislation/bills/2019/s6599.

Page 19

NYISO, "Reliability and a Greener Grid: Power Trends 2019," www.nyiso.com/documents/20142/2223020/2019-Power-Trends-Report.pdf, pg. 10.







