Chapter 11: Energy

11.1 Introduction

New building and alteration projects are subject to the New York City Energy Conservation Code (NYCECC), which comprises the 2010 Energy Conservation Construction Codes of New York State (NYSECC) and several local laws. According to the *2014 CEQR Technical Manual*, most actions resulting in new construction would not create significant energy impacts, and as such do not require a detailed energy assessment. However, a proposed action's operational energy consumption should be estimated.

As described in Chapter 1, "Project Description," the New York City Department of City Planning (DCP) is proposing to establish the East Midtown Subdistrict within the Midtown Special District. Under the Reasonable Worst-Case Development Scenario (RWCDS), the Proposed Action would result in approximately 13,394,777 gross square feet (gsf) of office floor area, 601,899 gsf of retail floor area, and 237,841 gsf of residential floor area.

For CEQR purposes, energy impact analyses focus on a project's energy consumption. Therefore, this chapter provides an estimate of the additional energy consumption associated with the Proposed Action.

Principal Conclusions

Although the Proposed Action would create an increased demand on energy systems including electricity and gas, the Proposed Action would not result in a significant adverse impact on energy systems. Relative to the capacity of these systems and the current levels of service within New York City, this increased energy demand would be minor. Moreover, the incremental annual demand expected to result from the Proposed Action would represent a negligible portion of the City's forecasted annual energy requirements: approximately 0.7 percent of the City's forecasted annual energy requirement or 3.06 trillion Btu of energy annually, an increase of approximately 1,267,573 million Btu (371 GWh) when compared with the No-Action Condition. Electrical, gas and steam connections are readily available in the proposed rezoning area. Furthermore, by replacing aging structures, any new development under the Proposed Action would be required to comply with NYCECC. The Proposed Action would neither involve energy-intensive uses such as data centers and web hosting facilities nor would it remove a source of energy generation.

11.2 Methodology

To assess the Proposed Action's potential impacts on energy, this chapter:

- Presents data on the existing energy distribution system and estimated energy usage for Existing Conditions.
- Determines future energy demands without and with the Proposed Action for 2036, using energy consumption rates for typical land uses provided in the *CEQR Technical Manual*.
- Assesses the effects of this incremental energy demand on the local distribution system and regional energy supplies.

This chapter calculates the annual energy consumption of the properties that are anticipated to be affected by the Proposed Action under Existing, No-Action, and With-Action Conditions, and the net change in energy consumption (which represents the Proposed Action's anticipated energy use). As the calculation of energy demand is a density-based technical analysis, only the anticipated development on the Projected Development Sites are evaluated in this assessment. The type of buildings anticipated as a result of the Proposed Action (e.g., new Class A office buildings) commonly adhere to Leadership in Energy and Environmental Design (LEED) or other high standards for environmental performance; conservatively, this analysis does not take this into account.

According to the *CEQR Technical Manual*, if a project, such as the Proposed Action, would rezone an area where projected development would occur on development sites not controlled by the applicant, detailed energy modeling would likely not be possible. For such projects, it is appropriate to estimate the project's energy consumption based on Table 15-1 in the *CEQR Technical Manual*, which provides the average annual energy consumption rates in New York City for various land uses. Therefore, this chapter uses the *CEQR Technical Manual*'s Table 15-1 to estimate annual energy consumption as a result of the Proposed Action. The measure of energy use in this chapter is British thermal units (Btu) per square foot of building floor area per year.[1] The assumptions utilized in calculating energy consumption for the Existing Conditions were also applied to the Projected Development Sites under the No-Action and With-Action Conditions.

11.3 Assessment

Existing Conditions

Energy Providers

Con Edison delivers electricity to all of New York City (except the Rockaway area in Queens) and almost all of Westchester County. The electrical energy is supplied from a variety of sources that originate both within and outside New York City. These include non-renewable sources, such as oil, natural gas, coal fuel, and uranium; and renewable sources, such as hydroelectricity and, to a much lesser extent, biomass fuels, solar power, and wind power. New York City's electrical demands are met by a combination of sources, including electricity generated within New York City, at locations across the Northeast, and from places as far away as Canada.

[1] One Btu is the quantity of heat required to raise one pound of water by 1 degree Fahrenheit.

Con Edison also provides steam service in parts of Manhattan including the East Midtown area. High-pressure steam is generated in cogeneration plants and conventional plants, and is distributed through an interconnected piping network (with pipe sizes up to 30 inches in diameter) to approximately 1,800 customers in Manhattan for heating, hot water, and air conditioning (HVAC). Many buildings within East Midtown use steam for their HVAC needs. Gas mains ranging from 4 to 24 inches supply natural gas for heating and cooking uses within the proposed rezoning area. Typically, these gas lines are located between 2 and 4 feet beneath the street.

In 2015, annual electricity usage in Con Edison's service area[2] totaled approximately 57 billion kilowatt hours (KWH), or 194.5 trillion Btu. In addition, Con Edison supplied approximately 156.4 trillion Btu of natural gas and approximately 21.9 billion pounds of steam, which is equivalent to approximately 26.4 trillion Btu. Overall, approximately 377.3 trillion Btu of energy were consumed in 2015 within Con Edison's New York City and Westchester County service area.[3]

Recent Energy Conservation Directives

In December 2009, the City Council passed four laws, collectively known as the Greener, Greater Buildings Plan (GGBP), that require energy efficiency upgrades and energy transparency in large existing buildings. Specifically, these laws call for annual benchmarking, energy audits, retro-commissioning, lighting upgrades, and sub-metering of commercial tenant space. Three out of these four laws only affect the City's largest 16,000 properties, both public and private, that compose half the built area in the City. Through the enactment of one of those laws, beginning in 2011, privately owned buildings over 50,000 square feet were required to submit reports of energy performance measurements in a process called "benchmarking." Though buildings of this size represent just 2 percent of the total number of buildings in the City, they are responsible for approximately 45 percent of total energy consumption, making this law both targeted and high-impact. By 2030, these laws are expected to reduce greenhouse gas (GHG) emissions by at least 5 percent citywide.[4]

The City has also taken steps to enable private property owners to install renewable energy systems on their buildings. The City Planning Commission recently approved the "Zone Green" proposal to amend the City's zoning resolution to more flexibly allow rooftop solar and wind facilities as well as better insulation.

Existing Demands

In estimating the existing annual energy consumption at the Projected Development Sites, the rates provided in Table 15-1 of the *CEQR Technical Manual* were utilized. As shown in Table 11.1, below, current annual energy use on the 16 Projected Development Sites is estimated to be approximately 1.76 trillion Btu for all heating, cooling, and electric power. This is equivalent to approximately 0.5 percent of the total annual energy consumption in 2015 within Con Edison's New York City and Westchester County service area.

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[2] The Con Edison service area includes electricity to all of New York City (except the Rockaway Peninsula in Queens) and most of Westchester County; gas to Manhattan, the Bronx, northern Queens, and most of Westchester; and steam from the Battery to 96th Street, Manhattan.

[3] Source: Con Edison of New York, *Annual Report, 2015.*

[4] Source: PlaNYC, adopted in 2007 and updated in April 2011; Energy Chapter, page 107 (Updated in 2015 to OneNYC, The Plan for a Strong and Just City)

Table 11.1: Existing Estimated Annual Energy Consumption on Projected Development Sites

Building Type/Use	Rate of Consumption (Thousand Btu (MBtu)/sq. ft)1	Floor Area (sq. ft)2	Annual Energy Consumption (million Btu)
RWCDS Projected Development Sites			
Commercial	216.3	8,139,436	1,760,560
Residential (>4 family)	126.7	50,813	6,438
		Total Energy Consumption	1,766,998

Notes:
[1] Based on rates provided in the *CEQR Technical Manual*, Table 15-1.
[2] RWCDS totals for all Projected Development Sites (refer to Table 1.2 in Chapter 1, "Project Description").
MBtu = Thousand Btu

The Future without the Proposed Action (No-Action Condition)

Energy consumption under the No-Action Condition would increase slightly compared to Existing Conditions. Annual energy consumption estimates for each use under the Existing and No-Action Conditions are provided in Table 11.2. As shown in Table 11.2, it is estimated that buildings developed under the No-Action Condition would use 1.79 trillion Btu of energy annually. This represents an increase of approximately 23,044 million Btu over Existing Conditions.

Table 11.2: No-Action Condition: Estimated Annual Energy Consumption on Projected Development Sites

Building Type/Use	Rate of Consumption (Thousand Btu (MBtu)/sq. ft)1	Existing Conditions		No-Action Condition	
		Floor Area (sq. ft)2	Annual Energy Consumption (million Btu)	Floor Area (sq. ft)2	Annual Energy Consumption (million Btu)
Commercial	216.3	8,139,436	1,760,560	8,090,569	1,749,990
Residential (>4 family)	126.7	50,813	6,438	316,120	40,052
Total Energy Consumption			1,766,998	1,790,042	

Notes:
[1] Based on rates provided in the *CEQR Technical Manual*, Table 15-1.
[2] RWCDS totals for all Projected Development Sites (refer to Table 1.2 in Chapter 1, "Project Description").
MBtu = Thousand Btu

According to the New York Independent System Operator 2015 Load & Capacity Data report, annual energy requirements for 2025 are forecasted at approximately 160,065 gigawatt hours (GWh), or 546.2 trillion Btu. Of this forecasted annual energy demand, 51,898 GWh (or 177.1 trillion Btu) is expected to come from Zone J (New York City). The anticipated 23,044 million Btu increase in annual energy consumption due to development under the No-Action Condition therefore represents 0.013 percent of New York City's forecasted future total annual energy demand.

The Future with the Proposed Action (With-Action Condition)

Compared with the No-Action Condition, the Proposed Action would result in a net increase of 5,906,107[5] gsf of commercial and a net decrease of 78,279 gsf of residential floor area.

Table 11.3 shows the estimated energy consumption due to the Proposed Action. Buildings developed under the Proposed Action would use approximately 3.06 trillion Btu of energy annually, which represents an increase of approximately 1,267,573 million Btu (371 GWh) when compared with the No-Action Condition. This increase in annual demand would represent approximately 0.7 percent of the City's forecasted annual energy requirement of 51,898 GWh for 2025, and therefore is not expected to result in a significant adverse impact on energy systems.

Table 11.3: With-Action Condition: Estimated Annual Energy Consumption on Projected Development Sites

Building Type/Use	Rate of Consumption (Thousand Btu (MBtu)/sq. ft)1	No-Action Condition		With-Action Condition		Energy Use Increment (million Btu)
		Floor Area (sq. ft)2	Annual Energy Consumption (million Btu)	Floor Area (sq. ft)2	Annual Energy Consumption (million Btu)	
Commercial	216.3	8,090,569	1,749,990	13,996,676	3,027,481	1,277,491
Residential (>4 family)3	126.7	316,120	40,052	237,841	30,135	-9,917
Total Energy Consumption			1,790,042	3,057,616		1,267,573

Notes:
[1] Based on rates provided in the CEQR Technical Manual, Table 15-1.
[2] RWCDS totals for all Projected Development Sites (refer to Table 1.2 in Chapter 1, "Project Description").
[3] For conservative energy consumption analysis purposes, parking was not included in the calculations because it represents a negative increment.
MBtu = Thousand Btu

Additionally, any new development resulting from the Proposed Action would be required to comply with the NYCECC, which governs performance requirements of heating, ventilation, and air conditioning systems, as well as the exterior building envelope of new buildings. In compliance with this code, new developments must meet standards for energy conservation, which include requirements relating to energy efficiency and combined thermal transmittance.[6] The Proposed Action requires that office buildings constructed under the proposed as-of-right framework comply with environmental performance standards. In addition, the Proposed Action would encourage the construction of new sustainable office buildings incorporating best practices for energy efficiency, meeting the City's goals of improving environmental performance through green building construction in conjunction with realizing the goals of the Proposed Action.

Based on the above information, no significant adverse energy impacts would result from the Proposed Action.

[5] Estimate of net commercial gsf includes mechanical gsf and accounts for projected decrease in hotel gsf.

[6] Developments resulting from the Proposed Action would be constructed pursuant to the NYCECC performance path, rather than the trade-off or prescriptive paths. The performance path uses energy modeling to demonstrate that the total annual energy cost of the proposed building design is less than or equal to the total annual energy cost of the budget building design.