Chapter 16: Energy

A. INTRODUCTION

This chapter examines the potential effect of the Proposed Actions on energy services by 2015 and 2030. As described below, development resulting from the Proposed Actions would place an increased demand on energy services. Currently, uses within the Project Area generate some demand for energy. With the Proposed Actions, the energy demand would increase in the Academic Mixed-Use Area and Subdistricts B, C, and the Other Areas.

PRINCIPAL CONCLUSIONS

Although the development expected in the Project Area would create new demands on energy supply systems, the additional demand would not be large enough to cause significant adverse impacts on energy services.

Construction of the new Columbia buildings in Subdistrict A located between West 131st and West 132nd Streets and Broadway and Twelfth Avenue would be contingent upon Columbia entering into an agreement with the Consolidated Edison Company of New York, Inc. (Con Edison) for relocating a Con Edison cooling station located on that block; this agreement has not been reached. Columbia and Con Edison are considering relocation sites within the Academic Mixed-Use Area (Subdistrict A), and have preliminarily identified a portion of the former Warren Nash Service Station building as a potential location. The equipment can operate either on an open site or within an enclosed space. The only discharge would be hot air from the heat exchangers. The relocation of the West 132nd Street cooling station is not expected to have a significant adverse impact on the transmission of electricity by Con Edison or on their rate payers.

B. EXISTING CONDITIONS

Con Edison delivers electricity to all of New York City (except the Rockaway area in Queens) and almost all of Westchester County. The electricity is generated by a number of independent power companies as well as Con Edison. In 2006 (the latest year for which data are available), annual electric sales totaled about 57.0 billion kilowatt-hours (KWH) in Con Edison's delivery area. This is equivalent to about 195.8 trillion British Thermal Units (BTUs). In addition, Con Edison supplied about 107.5 trillion BTUs of natural gas and 23.25 billion pounds of steam, which is equivalent to 22.5 trillion BTUs. Overall, about 325.8 trillion BTUs of energy are consumed within Con Edison's New York City and Westchester County service area.

Current energy use in the Project Area is estimated to be 115,000 million BTUs per year for all heating, cooling, and electric power (see Table 16-1). This is six orders of magnitude less than energy used overall in New York City. As a percentage, the current energy use is about 0.0002 percent of the overall energy use within Con Edison's service area.

Table 16-1
Estimated Existing Annual Energy Consumption

Use	Size (Square Feet)	Rate (BTUs/Sq Ft/Year)	Consumption (Million BTUs/Year)
Residential	129,360	145,500	18,822
Retail	213,080	55,800	11,890
Office	184,040	77,900	14,337
Industrial	1,250,460	44,100	55,145
Utility/transportation	341,690	44,100	15,069
Totals	**2,118,630**	**NA**	**115,263**

Source: Rates from 2001 *CEQR Technical Manual*.

C. 2015 FUTURE WITHOUT THE PROPOSED ACTIONS

The demand for electricity is expected to increase by about 1.5 percent per year in New York City. To meet that demand, a number of power plant construction projects are planned or are currently under way. In addition, a number of electric transmission projects are proposed to bring electric power from outside New York City into the City. While not all of the projects will likely be constructed, sufficient additional generating capacity is expected to be built to meet New York City's projected future energy demands.

In June 2002, New York State Energy Planning Board released the *New York State Energy Plan and Environmental Impact Statement*, which was updated in March 2006. This plan and its updates set out the New York State energy policies and objectives. The plan's policy objectives are to support safe, secure, and reliable operation of the energy and transportation systems; to stimulate sustainable economic growth through competitive market development; to increase energy diversity; to promote a cleaner and healthier environment; and to ensure fairness, equity, and consumer protection. These objectives continue the policies developed in earlier energy plans. No large-scale changes in energy generation and consumption policies are foreseen. In the future, Con Edison and other energy providers are expected to continue to deliver energy throughout New York City.

In the future without the Proposed Actions, a number of other projects are expected to be constructed and completed by 2015 (see Chapter 2, "Procedural and Analytical Framework," for details). These include the West Harlem Waterfront park, and streetscape and intersection improvements along West 125th Street and Twelfth Avenue. Columbia University is planning reconstruction of several existing spaces within the Project Area and building of new facilities outside the Project Area. Private developers have also proposed rezoning and redevelopment of nearby sites. The overall increased demand from these projects would be minimal, as compared with existing conditions, and therefore would not change the transmission and delivery systems of energy in the Project Area.

D. 2015 FUTURE WITH THE PROPOSED ACTIONS

Chapter 1, "Project Description," describes Columbia's proposed development in the Academic Mixed-Use Area (Subdistrict A) and any projected development that could occur in Subdistricts B, C, and the Other Areas. To ensure a conservative energy consumption analysis, all of the development that could occur in the Project Area outside Subdistrict A was assumed to be

completed by 2015. The energy consumption rates are from the *City Environmental Quality Review (CEQR) Technical Manual*. As discussed below, the energy consumption rates are likely to be lower, and, therefore, this analysis is conservative.

ENERGY GENERATION

In 2015, a central energy plant on Site 2 would provide heating and cooling to Columbia University's buildings in the Academic Mixed-Use Area. The central energy plant could serve buildings on Sites 2, 3, 4, and 7. The building on Site 1 would have its own boiler or be served by the central energy plant. The central energy plant would have conventional boilers that would each provide 40,000 pounds per hour (lb/hr) of steam to Columbia's buildings. The central energy plant would be built in phases and would have a maximum capacity of 160,000 lb/hr of steam. The boilers could either operate on natural gas or distillate fuel oil, depending on availability. The boilers would be equipped with low-nitrogen oxide (NO_x) burners. Chapter 24, "Alternatives," presents an analysis of other types of power generation that could be used in the Academic Mixed-Use Area.

Lighting and other energy needs within the Academic Mixed-Use Area and development outside the Academic Mixed-Use Area are expected to use the existing energy generation, transmission, and distribution systems.

POTENTIAL ENERGY CONSERVATION MEASURES

Columbia University has stated that it is committed to incorporating energy and environmental design elements into the proposed development and will construct buildings that would minimize energy consumption and maximize energy performance. This commitment is intended to translate into an improved environment both for building occupants and the surrounding community through the reduction in the use of non-renewable resources and lower building operating costs.

Columbia University has stated that it is developing new policies regarding environmental stewardship and sustainability. With respect to the operation of existing buildings and the construction and operation of new buildings, Columbia states that the policies and guidelines will be informed by the latest developments and published guidelines that have been developed by private groups and government agencies, including the United States Green Building Council (USGBC), the U.S. Environmental Protection Agency (EPA), and the U.S. Department of Energy (DOE). Laboratories for the 21st Century (Labs21) is a cooperative program of EPA and DOE. The purpose of Labs21 is to improve the energy efficiency and environmental performance of laboratories. USGBC has developed the Leadership in Energy and Environmental Design (LEED), a building-specific rating system. Recognizing that LEED in particular is a set of evolving standards and has not yet completely addressed sustainability in large scale development or the particular needs of academic research buildings, Columbia University will monitor the development of LEED standards and ensure that its energy and efficiency guidelines reflect the evolving LEED standards as they relate to the Proposed Actions. This section summarizes the major elements of this new policy, which would be in effect for the construction of the proposed new Columbia University buildings in Manhattanville.

COLUMBIA UNIVERSITY'S ENERGY AND ENVIRONMENTAL DESIGN POLICY

Consistent with LEED and Labs21, and with policies developed and adopted by cities and peer universities, Columbia has stated that it will commit to:

- Design, build, and operate residential and academic buildings within the Project Area to achieve a minimum of LEED NC v. 2.2 Silver certification;
- Design, build, and operate new academic research buildings using the Labs21 guidelines as a planning tool, and demonstrate leadership in sustainability by endeavoring to achieve a minimum of LEED NC v. 2.2 Silver certification for these buildings as well;
- Commission all newly constructed buildings to ensure optimal system performance;
- Establish a revolving central Green Fund in the amount of $10 million for energy efficient measures relating to building components and operations that may be more expensive than for conventional buildings;
- Reduce energy consumption in all new construction and major renovations as compared with the requirements in the New York State Energy Conservation Construction Code;
- Promote building designs that improve indoor environmental quality by incorporating natural light and ventilation where practicable to create an improved working and learning environment for University faculty, other employees, students, and guests; and
- Draw on the expertise of design, energy, and environmental nongovernmental organizations, government agencies, community organizations, employees and faculty members, and others with expertise to keep abreast of the latest developments in the field and continue to incorporate new knowledge of the best practices into its policies and guidelines.

These commitments will be included in the Restrictive Declaration for the Academic Mixed-Use Area.

PROBABLE IMPACTS OF THE PROPOSED ACTIONS ON ENERGY

For analysis purposes, a reasonable worst-case development scenario was developed to determine the likely maximum energy consumption from proposed new uses in the Academic Mixed-Use Area. Table 16-2 shows the Proposed Actions' expected energy demand. The development shown in this table differs from the Illustrative Plan to demonstrate the maximum potential energy demand that could occur from the Proposed Actions. Uses that consume the greatest amount of energy, such as academic research and housing for graduate students, faculty, and other employees, have been maximized, and uses with low energy demands have been minimized. Development resulting from the Proposed Actions would be required to comply with the New York State Energy Conservation Construction Code, which governs performance requirements of heating, ventilation, and air conditioning systems, and the exterior building envelope of new buildings. In compliance with the code, the buildings would incorporate all required energy conservation measures, including meeting the code's requirements relating to energy efficiency and combined thermal transmittance.

The proposed development would displace a number of existing uses and eliminate their energy consumption. (See Chapter 4, "Socioeconomic Conditions," for a description of displaced uses.) This reduction is estimated to be 25,011 million BTUs per year. The total energy consumption within the Academic Mixed-Use Area and Subdistricts B, C, and the Other Areas is estimated at 155,237 million BTUs. The additional consumption of about 130,226 million BTUs per year would be very small, compared with the existing energy demands of New York City. Further, this additional demand is not expected to overburden the energy generation, transmission, and distribution system, and would not cause a significant adverse energy impact.

Table 16-2
Projected Energy Consumption in 2015

Use	Size (Square Feet)	Rate (BTUs/Square Foot/Year)	Consumption (Million BTUs/Year)
Academic Mixed-Use Area (Subdistrict A)			
University housing	175,000	145,500	25,463
Active ground floor	36,500	55,800	2,037
Academic	521,939	76,400	39,876
Academic research	370,000	125,000	46,250
Below grade	305,195	44,100	13,459
Subtotal	**1,408,634**	**NA**	**127,085**
Subdistrict B[1] and the Other Area East of Broadway			
Residential	88,819	145,500	12,923
Retail	124,196	55,800	6,930
Office	54,808	77,900	4,270
Community facility	61,698	65,300	4,029
Subtotal	**329,521**	**NA**	**28,152**
Total Energy Consumption			**155,237**

[1] CPC is contemplating certain modifications to Subdistrict B that would not result in any projected development sites in Subdistrict B. The proposed modifications are more fully described in Chapter 29, "Modifications to the Proposed Actions."

E. 2030 FUTURE WITHOUT THE PROPOSED ACTIONS

The size of the energy generation, transmission, and distribution systems are expected to increase to accommodate anticipated growth in New York City. However, the basic generation, transmission, and distribution systems are expected to remain essentially the same.

F. 2030 FUTURE WITH THE PROPOSED ACTIONS

CON EDISON COOLING STATION

A Con Edison transmission line cooling station is located between West 131st and West 132nd Streets and Broadway and Twelfth Avenue. The station cools oil (the cooling medium) for two underground major transmission lines that bring electricity from the Sprainbrook Substation in Westchester County to the West 49th Street Substation in Manhattan. A total of eight pipes, each 5 inches in diameter, run under West 132nd Street and carry oil to and from the cooling station to the transmission lines, which run under Broadway. The cooling station contains air-cooled heat exchangers and refrigeration equipment to cool the hot oil.

Construction of the new Columbia buildings in Subdistrict A on this block would be contingent upon Columbia entering into an agreement with Con Edison for relocating the cooling station; this agreement has not been reached. Such an agreement would require the approval of the New York State Public Service Commission (PSC) pursuant to Public Service Law (PSL) Section 70, and such approval by PSC would be subject to review under the State Environmental Quality Review Act (SEQRA).

Columbia and Con Edison are considering relocation sites within the Academic Mixed-Use Area (Subdistrict A), and have preliminarily identified a portion of the former Warren Nash Service Station building as a potential location. The equipment can operate either on an open site or within an enclosed space. The only discharge would be hot air from the heat exchangers.

It is possible that the cooling equipment and transmission lines could be upgraded to be more efficient during this relocation. The cost of relocating the cooling station would be paid by Columbia University and not by Con Edison or its rate payers. To ensure the 345-kilowatt electric transmission lines remain operational, the West 132nd Street cooling station would be maintained until the new cooling station is tested and in full operating condition before disconnecting the lines from the existing cooling station. Therefore, relocation of the West 132nd Street cooling station is not expected to have a significant adverse impact on the transmission of electricity by Con Edison or on its rate payers.

ENERGY GENERATION

In Phase 2, the central energy plant located beneath Site 3 would continue provide heating and cooling to the 2015 buildings, and would be expanded to provide heating and cooling to the new buildings on Sites 6, 6b, 8, 9, and 10. A second central energy plant with a maximum capacity of 80,000 lb/hr of steam would be built on Site 14. This second energy center could serve all buildings on the block surrounded by West 132nd and West 133rd Streets, Broadway, and Twelve Avenue. In Phase 2, all of the central energy plant boilers would operate using natural gas exclusively. Like the first central energy plant, the boilers would be equipped with low-NO_x burners. The building on Sites 15, 16, and 17 would have their own separate boilers for heating and cooling. Chapter 24 provides an analysis of other types of power generation in the Academic Mixed-Use Area.

Lighting and other energy needs within the Academic Mixed-Use Area and development outside the Academic Mixed-Use Area are expected to use the existing energy generation, transmission, and distribution systems.

PROBABLE IMPACTS OF THE PROPOSED ACTIONS ON ENERGY

For analysis purposes, a reasonable worst-case development scenario was developed to determine the likely maximum energy consumption from proposed new uses in the Academic Mixed-Use Area. Table 16-3 shows the Proposed Actions' expected energy demand. The development shown in this table differs from the Illustrative Plan to demonstrate the maximum potential energy demand that could occur from the Proposed Actions. Uses with the highest energy demands, such as academic research and housing for graduate students, faculty, and other employees, have been maximized, and uses with low energy demands have been minimized. The maximum above-grade development by 2030 in the Academic Mixed-Use Area resulting from the Proposed Actions would be required to comply with the New York State Energy Conservation Construction Code, which governs performance requirements of heating, ventilation, and air conditioning systems, as well as the exterior building envelope of new buildings. In compliance with the code, the buildings would incorporate all required energy conservation measures, including meeting the code's requirements relating to energy efficiency and combined thermal transmittance.

By 2030, all of the existing uses would be displaced (the uses displaced between 2015 and 2030 are estimated to consume about 90,252 million BTUs). Chapter 4 contains a description of displaced uses. New University uses would consume approximately 653,498 million BTUs per

year. The net consumption (new uses minus displaced uses) of 563,246 million BTUs per year would be small, compared with the existing energy demands of New York City. This additional demand is not expected to overburden the energy generation, transmission, and distribution system, and would not cause a significant adverse energy impact.

Table 16-3
Projected Energy Consumption in 2030

Use	Size (Square Feet)	Rate (BTUs/Square Foot/Year)	Consumption (Million BTUs/year)
University housing	1,300,000	145,500	189,150
Active ground floor	130,000	55,800	7,254
Academic	1,000,000	76,400	76,400
Academic research	2,345,016	125,000	293,127
Subtotal Above Ground	**4,775,016**	**NA**	**565,931**
Below-ground service	1,985,657	44,100	87,567
Total Energy Consumption			**653,498**

G. CONCLUSIONS

The development that could occur with the Proposed Actions in 2015 and 2030 would increase energy demand, but not to the degree that it would cause a significant adverse impact on the energy generation, transmission, and distribution systems. ✷