Chapter 15: Energy

A. INTRODUCTION

The proposed project would generate a new demand for energy at the site. Currently that demand is limited to the existing New York City Department of Sanitation (DSNY) facilities at the site including the DSNY landfill systems (e.g., the leachate plant and conveyance systems) and the energy provided to DSNY operated services and structures. With the proposed project there would be new recreational fields with lighting, park and street lighting, and lighting of the various commercial and cultural facility spaces. This chapter assesses these energy demands and the potential for the proposed project to impact the delivery of energy to the area or the project site. It considers the net incremental impact between the conditions in the future without the proposed project and the future with the proposed project under the two analysis years, 2016 and 2036. This chapter also concludes with a description of the sustainability measures that are being proposed by the project.

B. METHODOLOGY

As described below, this chapter presents data on the existing energy distribution system and estimated energy usage for existing conditions; determines future energy demands with the proposed project for the two analysis years using energy usage rates for typical land uses provided in the *CEQR Technical Manual* and other available literature sources; and assesses the effects of this incremental energy demand on the local distribution system and regional energy supplies. In addition, this chapter describes the proposed design features that would be incorporated into the project for the purposes of minimizing project demands on these energy systems.

C. EXISTING CONDITIONS

ENERGY PROVIDERS

Electricity within New York City is generated by Consolidated Edison (Con Edison), as well as a number of independent power companies, including KeySpan Energy. Electrical energy in New York City is supplied from a variety of sources that originate both within and outside the City. These sources include non-renewable sources such as oil, natural gas, and coal fuel, and renewable sources such as hydroelectric, and, to a much lesser extent, biomass fuels, solar, 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. For the more distant sources, once electrical energy is generated as high voltage electrical power, a transmission grid conveys this power to New York City for distribution. An interconnected high voltage power grid extending across New York State and the Northeast allows for power to be imported from other regions as demand requires. A total of

an estimated 50 billion kilowatt hours (KWH) or 170.75 trillion British Thermal Units (BTUs) of electricity are consumed in the City annually.

According to the New York Independent System Operator (NYISO) *2005 Load & Capacity Data* report, the peak electrical demand for New York City in summer 2004 was 9,769 megawatts (MW).[1] Typically, electricity generated within the City is sufficient to satisfy demand. However, during the summer peak demand period, this electricity is often supplemented by the Northeast transmission grid. As a result, there is an ongoing service and distribution improvement program for Con Edison infrastructure that upgrades localized areas that are continually high demand zones. Electricity required for these zones is supplied by other zones in New York City, or from sources elsewhere within the larger grid if necessary.

Con Edison distributes power throughout the City. Transmission substations receive electricity from the regional high voltage transmission system and reduce the voltage to a level that can be delivered to area substations. Area substations further reduce the voltage to a level that can be delivered to the distribution system, or street "grid." Within the grid, voltage is further reduced for delivery to customers. Each area substation serves one or more distinct geographic areas, called networks, which are isolated from the rest of the local distribution system. The purpose of the networks is that if one substation goes out of service the problem can be isolated to that network and not spread to other parts of the City. Substations are designed to have sufficient capacity for the network to grow.

Power plants in the five boroughs generate electricity for New York City. According to NYISO's *Locational Installed Capacity Requirements Study* for the 2005-2006 period, New York City has an existing installed generating capacity of 9,887 MW (not including Special Case Resources).[2]

KeySpan Energy provides natural gas service to more than 2.6 million customers in the New York City boroughs of Brooklyn, Queens, and Staten Island, in Nassau and Suffolk Counties on Long Island, and in Massachusetts and New Hampshire. The company operates more than 21,000 miles of gas mains in its service territory, and also owns and operates electrical generating plants on Long Island and within New York City, with a total generating capacity of more than 6,600 megawatts.[3]

ENERGY INITIATIVES

In 2001, New York State began taking measures to address the increasing electrical power capacity needs of the metropolitan New York City region. The Governor's Executive Order No. 111 (EO 111) was introduced in June of 2001, directing state agencies, state authorities, and other affected entities to address energy efficiency, renewable energy, green building practices, and alternate fuel vehicles. EO 111 identified the New York State Energy Research and

[1] New York Independent System Operator 2005 Load & Capacity Data, www.nyiso.com/public/webdocs/services/planning/planning_data_reference_documents/2005_GoldBook_Redact.pdf (February 23,2006)

[2] NYISO Locational Installed Capacity Requirements Study Covering the New York Control Area for the 2005-2006 Capability Year, February 17, 2005, revised March 23, 2005. According to the Study, Special Case Resources (SCRs) are "loads capable of being interrupted, and distributed generators, rated at 100 kW or higher, that are not directly telemetered."

[3] Keyspan Energy website: http://www.keyspanenergy.com/corpinfo/about/facts_all.jsp (February 23, 2006)

Development Authority (NYSERDA) as the organization responsible for coordinating and assisting agencies and other affected entities with their responsibilities. NYSERDA and the utilities have implemented programs to encourage businesses to reduce energy usage and increase energy efficiency. In addition to the energy conservation techniques, NYPA constructed 11 new 44-MW, natural gas-fired, simple cycle turbine generating units, 10 of which are located within New York City, for emergency power generation (the other facility is on Long Island).

The independent, non-profit New York State Reliability Council (NYSRC) has determined that a minimum of 80 percent of the City's peak load must be provided by generating sources within the City to maintain compliance with the criteria established by the regional and national reliability councils. Currently, there is sufficient capacity within the City to meet this 80 percent goal. However, as energy demand increases over time, additional in-City generation may be needed.

EXISTING PROJECT SITE DEMAND

Given its size, the project site presently has a limited energy need in the larger context of energy demands for the borough, but it does have demands associated with the active on site DSNY support facilities and landfill control systems. This would include electrical demands of the leachate treatment plant as well as lines around the periphery of each landfill section serving the leachate conveyance systems. There are also lines that serve the landfill gas flare stations. Electrical transformers at the site are located in the northwest corner of Landfill Section ¾, on Landfill Section 2/8 and at the west side of Landfill Section 6/7. There are also electrical lines servicing the DSNY facilities along Muldoon Avenue. Off-site there are electrical transmission lines around the periphery of site (e.g. along Arthur Kill Road, Richmond Avenue, and along the West Shore Expressway).

D. FUTURE WITHOUT THE PROPOSED PROJECT: 2016 AND 2036

In the future without the proposed project, through both 2016 and 2036, the current energy demands at the project site are conservatively assumed to not change. It is expected that adequate electrical capacity would be available in the New York City metropolitan area through these two analysis years to handle the project-site generated demand.

E. PROBABLE IMPACTS OF THE PROPOSED PROJECT: 2016 AND 2036

2016

As described in Chapter 1 "Project Description," the park program through the 2016 build year would include North and South Parks as well as a proposed portion of Creek Landing. There would also be the build-out of a large portion of the internal park road system. The projected energy demands of this park program through 2016 are presented below based on a system that is entirely grid dependent (see Table 15-1). This is considered the Reasonable Worst Case Development Scenario (RWCDS) impact condition and does not include any of the energy sustainability measures proposed by the project (see that discussion in detail, below)

Table 15-1
Projected Energy (Electrical) Demands for the Proposed Project: 2016

Use	Demand (kWH/day)
Phase I (2016)	12,258
Source: Fresh Kills Preferred Utility Scenario, Ove Arup & Partners Consulting Engineers, December 2007.	

To provide this level of energy service to the project site, localized upgrades in the distribution system are expected to be necessary. There would also be the extension of electrical lines into the site at specific park locations and also along the proposed roads for the purposes of providing street lighting and service to park elements. As the site design moves forward and individual capital projects are proposed, it is expected that Consolidated Edison would identify site-specific upgrades and improvements necessary for the proposed project. However, the overall energy needs of the proposed project at 2016 would be minor compared with the overall energy consumption within the City and borough and the necessary local improvements to serve the proposed project would not adversely impact the local utility systems provision of service. It is therefore concluded that the proposed project would not adversely impact energy systems. In addition, as described below under the sustainability scenario, the proposed project includes a number of energy-saving measures.

2036

As described in Chapter 1 "Project Description," the proposed park program through the 2036 build year would include the East and West Parks as well as the Point in the Confluence and the completion of Creek Landing. Of all the parks areas, the Point would have the greatest energy demands since it would have the more intensive recreational, commercial and cultural programming. There would also be the build out of the internal park road system with the completion of the Signature Bridge. The projected energy demands through 2036 are presented below based on a system that is entirely grid dependent (see Table 15-2). As with 2016, this is considered the (RWCDS impact condition and does not include any of the sustainability measures proposed by the project (see that discussion in detail, below)

Table 15-2
RWCDS Projected Energy (Electrical) Demands for the Proposed Project: 2036

Use	Demand (kWH/day)
Phase II (2036)	30,589
Source: Fresh Kills Preferred Utility Scenario, Ove Arup & Partners Consulting Engineers, December 2007.	

As with 2016, to provide this level of service to the project site, localized upgrades in the distribution system are expected to be necessary. There would also be the extension of electrical lines into the project sites and along the proposed roads for the purposes of providing street lighting and service to park elements. This would be particularly true in providing service to the Point as the more intensively used areas with recreational field lighting and other uses such as the amphitheater are located here. As the site design moves forward and individual capital

projects are proposed, it is expected that Consolidated Edison would identify site-specific upgrades and improvements necessary for the proposed project. However, the overall energy needs of the proposed project at 2036 would be minor compared with the overall energy consumption within the City and borough and the necessary local improvements to serve the proposed project would not adversely impact the local utility systems provision of service. It is therefore concluded that the proposed project would not adversely impact energy systems. In addition, as described below, the proposed project includes a number of energy-saving measures.

SUSTAINABLE DESIGN FEATURES RELATED TO ENERGY DEMANDS

INTRODUCTION

This section describes how the demand for and provision of energy could be potentially reduced at Fresh Kills Park from what might be otherwise necessary under a standard energy design. This sustainability strategy is based on two assumptions:

- The reduction of energy within buildings and infrastructure; and
- The use of renewable energy technologies to supply a share of the proposed park's energy.

Table 15-3 presents calculations for how dependency on the grid would be reduced by implementing the various strategies described below. The calculations provide and energy value for each strategy. The final row in the table presents the energy required from the grid assuming all the strategies are implemented.

LEED/GREEN BUILDING PRINCIPLES (ENERGY DEMAND REDUCTIONS)

As a public project it is likely that the park would need to comply with Local Law 86 as City capital projects with a value of over $2 million must become accredited or meet green building standards equivalent to LEED Silver. Integrating green building practices can significantly reduce energy demand by approximately 30 percent and often more. This is considered quite achievable for new buildings in the New York Area. Table 15-3 shows that total energy required from the grid under this scenario would be 8,581 kWh/day for 2016 and 21,412 kWh for 2036.

Table 15-3
Energy (Electrical) Demands for the Proposed Project with Sustainability Measures: 2016 and 2036

Scenario	2016 Demand (kWH/day)	2036 Demand (kWH/day)
Baseline Energy From Grid (RWCDS)	12,258	30,589
Strategies/Technologies for reducing demand fro the grid		
LEED/Green building principles	8,581	21,412
Powering all outdoor lights with photovoltaic cells (excluding recreational field lights)	6,069	11,997
Powering 10 percent of remaining utility demand with wind turbines	5,348	11,277
Powering 10 percent of remaining utility demand with photovoltaic cells	4,830	9,378
Total cumulative demand assuming all reduction strategies	4,830	9,378

Sources: Fresh Kills Preferred Utility Scenario, Ove Arup & Partners Consulting Engineers, December 2007.

The feasibility and economic viability of these strategies and technologies would be determined after detailed, site-specific analysis is undertaken and project designs are further developed.

ENERGY SUPPLY TECHNOLOGIES

In addition to potentially reducing energy demands, a series of distributed renewable technologies could be installed as part of the proposed park, which would further reduce the project's reliance on grid-supplied energy. In most cases, these distributed sources would be backed up by the grid, primarily for reliability purposes, but such connections could also be used to sell power to the grid when possible.

Solar power and wind power are the two most widely used renewable technologies that could potentially be employed at Fresh Kills. Solar power can easily be integrated into buildings by installing photovoltaic panels (PVs) on roofs, using solar powered lighting, and to heat water for direct use or heating. This scenario assumes three measures for renewable energy technologies on site:

- All outdoor lighting, except floodlights, are powered by PVs and are not grid connected;
- Approximately 10 percent of the remaining energy demand is met by PV installations; and
- Approximately 10 percent of the remaining energy demand is met by wind turbines

Solar Power

Solar Powered Lights

Implementing solar powered lights would entail powering all outdoor lights powered by PVs as independent units. This would include all outdoor lighting except where floodlights are required, e.g., for sports fields. Specific lighting products would need to be sourced and their specifications would need to meet with New York City Department of Parks and Recreation (DPR) standards where applicable. The cost of lights powered by PVs is generally more than conventional lights, but it is expected that this cost would be offset by reduced infrastructure installation and operational costs.

Solar Thermal Technologies

Solar thermal technologies also have potential throughout the site where there is a demand for hot water and heating. Solar thermal technologies can contribute to reducing energy use from heating water and are compatible with PV installations. Large comfort stations, restaurants, and cafes are all well suited applications for such solar exchangers.

Wind Power

There is potential for wind technology on the site, however, the locations are not ideal. This scenario assumes that approximately 10 percent of total site demand would come from wind energy, which would require two mid-sized turbines. Mid-sized turbines (100 feet to hub) offer a compromise between generating a significant amount of energy without being overly imposing. Smaller-sized turbines were also considered for delivering electrical energy, to the site, but were less effective than mid-sized turbines. Approximately 10 small turbines would be required to supply the same energy as two mid-sized turbines. Thus, due to site constraints, having more efficient energy producers occupying less surface area would be preferable.

The wind turbines would be located in off-mound areas with high energy demand to reduce infrastructure costs from cabling. A potential site for the turbines would be in the Point area of

the Confluence. There is a high energy demand in this area from restaurant uses and sports field lighting. This location is also more exposed to prevailing winds and less obstructed than other areas with high energy demand. There may also be more stable foundations in this area as it is on the periphery of the landfill site.

It is assumed that each turbine could generate approximately 360 kWh/day under conservative conditions (15 percent capacity). Therefore, two turbines would not meet 10 percent of the energy demand in Phase 2 (2036), but they would contribute to the overall reduced dependency on the grid. The difference in meeting the 20 percent of demand from renewables could be met by increased PVs (see discussion above).

CONCLUSIONS

The proposed project would increase energy demands; however, relative to the capacity of these systems within the City and the current levels of service within the grid, these added demands would be insignificant. Improvements for local site connections would be installed by Consolidated Edison, as necessary, with respect to the local electrical distribution system. These improvements are expected to provide typical local upgrades in electrical line connections and no major improvements are anticipated. New electrical lines are proposed within the beds of the park roads that would be constructed as part of the proposed project. Moreover, the proposed project would have a sustainability program that would reduce energy demand from what would otherwise be expected in a conventionally designed energy system and would also provide the opportunity for renewable on-site sources for energy. It is therefore concluded that the energy demands of the proposed project would not result in a significant impact on energy demands in the region or the City as a whole, and with the proposed improvements to the distribution network, no impact would occur locally with respect to electrical or gas utilities. ✷