# A. INTRODUCTION

Increased concentrations of greenhouse gases (GHGs) in the atmosphere are changing the global climate, resulting in wide-ranging effects on the environment, including rising sea levels, increases in temperature, and changes in precipitation levels. Although this is occurring on a global scale, the environmental effects of climate change are also likely to be felt at the local level.

The City's goal to reduce citywide GHG emissions to 30 percent below 2005 levels by 2030 was codified by Local Law 22 of 2008, known as the New York City Climate Protection Act (the "GHG reduction goal").[1] The 2010, 2012, and 2014 updates to the *City Environmental Quality Review (CEQR) Technical Manual* identified types of projects undergoing environmental review for which consideration of GHG emissions and the assessment of the project's consistency with the City's GHG emission reduction goal are appropriate.

As discussed in Chapter 1, "Project Description," the proposed project would result in a 426,576-gross-square-foot (gsf) enlargement of the Staten Island Mall (the Mall) with new uses, including destination retail, cinema, supermarket, restaurant space, food court, and mall common area. The proposed project would result in more than 350,000 square feet of new development, which is one of the triggers for conducting a GHG assessment under CEQR. Therefore, this chapter assesses the GHG emissions associated with the proposed project. A project's consistency with the GHG reduction goal is evaluated in terms of qualitative goals to reduce GHG emissions. Accordingly, this chapter also discusses measures that would be implemented to limit GHG emissions.

## PRINCIPAL CONCLUSIONS

The proposed project would result in annual GHG emissions of approximately 33,000 metric tons of $CO_2$ equivalent ($CO_2e$) from the operation of the buildings. Of that amount, approximately 30,000 metric tons of $CO_2e$ would be emitted as a result of project-generated vehicle trips, while the remainder would be emitted as a result of grid electricity use and natural gas consumption on-site. As discussed in more detail in the following sections, the assessment of GHG emissions from project-generated vehicle trips is based on a highly conservative estimated estimate of the number of trips generated and distances traveled. These conservative assumptions regarding vehicle trip numbers were developed for assessing worst-case traffic conditions. In reality, the emissions generated from the proposed project vehicle trips would likely be much lower. Sustainable measures would be incorporated into the design and construction of the Project, which would decrease the potential GHG emissions. Based on the sustainable measures that would be included, the proposed project would be consistent with the City's emissions reduction goal, as defined in the *CEQR Technical Manual*.

[1] Administrative Code of the City of New York, §24-803.

## B. POLICY, REGULATIONS, STANDARDS, AND BENCHMARKS FOR REDUCING GHG EMISSIONS

As a result of the growing consensus that human activity resulting in GHG emissions has the potential to profoundly impact the earth's climate, countries around the world have undertaken efforts to reduce emissions by implementing both global and local measures addressing energy consumption and production, land use, and other sectors. Although the U.S. has not ratified the international agreements which set emissions targets for GHGs, in a step toward the development of national climate change regulation, the U.S. has agreed that deep cuts are necessary and has agreed to take action to meet this objective, with a stated goal of reducing emissions to 17 percent lower than 2005 levels by 2020 and to 83 percent lower than 2005 levels by 2050 (pending legislation) via the Copenhagen Accord.[2,3] Without legislation focused on this goal, the U.S. Environmental Protection Agency (EPA) is required to regulate greenhouse gases under the Clean Air Act (CAA), and has begun preparing and implementing regulations. In coordination with the National Highway Traffic Safety Administration (NHTSA), EPA currently regulates GHG emissions from newly manufactured on-road vehicles. In addition, EPA regulates transportation fuels via the Renewable Fuel Standard program, which will phase in a requirement for the inclusion of renewable fuels increasing annually up to 36.0 billion gallons in 2022. In 2014, EPA also proposed rules for to address GHG emissions from both new and existing power plants that would, for the first time, set national limits on the amount of carbon pollution that power plants can emit. EPA expects to expand this program in the future to limit emissions from additional stationary source.

There are also regional, state, and local efforts to reduce GHG emissions. In 2009, Governor Paterson issued Executive Order No. 24, establishing a goal of reducing GHG emissions in New York by 80 percent, compared to 1990 levels, by 2050, and creating a Climate Action Council tasked with preparing a climate action plan outlining the policies required to attain the GHG reduction goal and an interim draft plan has been published.[4] The State is now seeking to achieve some of the emission reduction goals via local and regional planning and projects through its Cleaner Greener Communities and Climate Smart Communities programs.

The 2009 New York State Energy Plan outlines the state's energy goals and provides strategies and recommendations for meeting those goals. A new draft plan has been published in January 2014. While the Plan does not set any specific quantified GHG reduction goals, it does outline a vision for transforming the State's energy sector which would result in increased energy efficiency (both demand and supply), increased carbon-free power production and cleaner transportation, in addition to achieving other goals not related to GHG emissions.

New York State has also developed regulations to cap and reduce $CO_2$ emissions from power plants to meet its commitment to the Regional Greenhouse Gas Initiative (RGGI). Under the RGGI agreement, the governors of nine Northeast and Mid-Atlantic states have committed to regulate the amount of $CO_2$ that power plants are allowed to emit, gradually reduced to 10

[2] UNFCCC Conference of the Parties, Copenhagen Accord, March 30, 2010.

[3] Todd Stern, U.S. Special Envoy for Climate Change, letter to Mr. Yvo de Boer, UNFCCC, January 28, 2010.

[4] New York State Climate Action Council, *New York State Climate Action Plan Interim Report*. November 2010.

percent below the 2009 cap through 2018. The RGGI states and Pennsylvania have also announced plans to reduce GHG emissions from transportation, through the use of biofuel, alternative fuel, and efficient vehicles.

Many local governments worldwide, including New York City, are participating in the Cities for Climate Protection campaign and have committed to adopting policies and implementing quantifiable measures to reduce local GHG emissions, improve air quality, and enhance urban livability and sustainability. New York City's long-term sustainability program, *PlaNYC 2030*, includes GHG emissions reduction goals, specific initiatives that can result in emission reductions and initiatives targeted at adaptation to climate change impacts. In addition to the GHG reduction goal discussed in the introductory section, the City has also announced a longer-term goal of reducing emissions to 80 percent below 2005 levels by 2050, and has published a study evaluating the potential for achieving that goal.

In December 2009, the New York City Council enacted four laws addressing energy efficiency in new and existing buildings, in accordance with PlaNYC. The laws require owners of existing buildings larger than 50,000 square feet to conduct energy efficiency audits every ten years, to optimize building energy efficiency, and to "benchmark" the building's energy and water consumption annually, using an online tool provided by EPA. By 2025, commercial buildings over 50,000 sf will also require lighting upgrades, including the installation of sensors and controls, more efficient light fixtures, and the installation of submeters, so that tenants can be provided with information on their electricity consumption. The legislation also creates a local New York City Energy Code, which along with the New York State Energy Conservation Code (as updated in 2010), requires equipment installed during a renovation to meet current efficiency standards.

A number of voluntary rating systems for energy efficiency and green building design have also been developed. For example, LEED is a benchmark for the design, construction, and operation of high performance green buildings that includes energy efficiency components. Another voluntary rating system is EPA's *Energy Star*—a labeling program designed to identify and promote the construction of new energy efficient buildings, facilities, and homes and the use of energy efficient appliances, heating and cooling systems, office equipment, lighting, home electronics, and building envelopes.

## C. METHODOLOGY

Although the contribution of any single project to climate change is infinitesimal, the combined GHG emissions from all human activity are believed to have a severe adverse impact on global climate. While the increments of criteria pollutants and toxic air emissions are assessed in the context of health-based standards and local impacts, there are no established thresholds for assessing the significance of a project's contribution to climate change. As required by the *CEQR Technical Manual*, this chapter presents the total GHG emissions potentially associated with the proposed project and identifies the measures that would be implemented and measures that are under consideration to limit the emissions.

The analysis of GHG emissions that would be generated by the proposed project is based on the methodology presented in the *CEQR Technical Manual*. Emissions of GHGs have been quantified, including off-site emissions associated with on-site use of electricity, on-site emissions from heating and hot water systems, and emissions from motor vehicle trips attributable to the proposed project. GHG emissions that would result from construction of the proposed project are discussed as well.

## POLLUTANTS OF CONCERN

GHGs are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere, and clouds. This property causes the general warming of the Earth's atmosphere, or the "greenhouse effect."

Carbon dioxide ($CO_2$) is the primary pollutant of concern from anthropogenic sources. Although not the GHG with the strongest effect per molecule, $CO_2$ is by far the most abundant GHG. $CO_2$ is emitted from any combustion process (both natural and anthropogenic), from some industrial processes such as the manufacture of cement, mineral production, metal production, and the use of petroleum-based products, from volcanic eruptions, and from the decay of organic matter. $CO_2$ is removed ("sequestered") from the lower atmosphere by natural processes such as photosynthesis and uptake by the oceans. $CO_2$ is included in any analysis of GHG emissions.

Methane and nitrous oxide also play an important role since the removal processes for these compounds are limited and these pollutants have a relatively high impact on global climate change as compared to an equal quantity of $CO_2$. Emissions of these compounds, therefore, are included in GHG emissions analyses when the potential for substantial emission of these gases exists.

The *CEQR Technical Manual* lists six GHGs that could potentially be included in the scope of an EIS: $CO_2$, nitrous oxide ($N_2O$), methane, Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur Hexafluoride ($SF_6$). This analysis focuses on $CO_2$, $N_2O$, and methane. There are no significant direct or indirect sources of HFCs, PFCs, or $SF_6$ associated with the proposed project.

To present a complete inventory of all GHGs, component emissions are added together and presented as $CO_2e$ emissions—a unit representing the quantity of each GHG weighted by its effectiveness using $CO_2$ as a reference. This is achieved by multiplying the quantity of each GHG emitted by a factor called global warming potential (GWP). GWPs account for the lifetime and the radiative forcing of each chemical over a period of 100 years (e.g., $CO_2$ has a much shorter atmospheric lifetime than $SF_6$, and therefore has a much lower GWP). The GWPs for the main GHGs discussed here are presented in **Table 12-1**.

## BUILDING OPERATIONAL EMISSIONS

Emissions from electricity and on-site use of natural gas for heating and hot water were calculated using information provided by the engineering consultant responsible for designing the heating, ventilation, and air conditioning (HVAC) systems. The building floor area, projected electricity use, and total natural gas use is shown in **Table 12-2**.

**Table 12-1**
**Global Warming Potential (GWP) for Major GHGs**

| Greenhouse Gas | 100-year Horizon GWP |
|---|---|
| Carbon Dioxide ($CO_2$) | 1 |
| Methane ($CH_4$) | 21 |
| Nitrous Oxide ($N_2O$) | 310 |
| Hydrofluorocarbons (HFCs) | 140 to 11,700 |
| Perfluorocarbons (PFCs) | 6,500 to 9,200 |
| Sulfur Hexafluoride ($SF_6$) | 23,900 |

**Source:** International Panel on Climate Change (IPCC), Climate Change 1995—Second Assessment Report.

**Table 12-2**
**Projected Annual Energy Use for the Proposed Project**

| Proposed Use | Floor Area (gsf) | Electricity (MWh/yr) | Natural Gas (DKT/yr) |
|---|---|---|---|
| Retail | 204,215 | 3,783 | 9,181 |
| Restaurant | 33,665 | 799 | 736 |
| Food Court | 10,831 | 442 | 2,183 |
| Cinema | 54,488 | 896 | 2,275 |
| Common Area | 73,377 | 572 | 985 |
| Supermarket | 50,000 | 1,175 | 1,489 |
| **Total** | **426,576** | **7,667** | **16,849** |

**Notes:**
gsf is gross square feet; The floor area for retail includes non-department store retail, department store retail, Macy's enlargement, conversion of existing loading docks to retail, and common mall space.
MWh/yr is megawatt hours per year; DKT/yr is dekatherms per year.
**Source:** Based on estimates from Dagher Engineering.

The electricity emission factor of 85.1 kg $CO_2e$ per gigajoule (GJ) [5] or approximately 0.3 metric tons of $CO_2e$ per megawatt hour (MWh) was used to calculate GHG emissions from the electricity use. The emission factor for natural gas provided in *CEQR Technical Manual* Table 18-4 was used to calculate emissions from natural gas use.

As detailed in Chapter 1, "Project Description," there is the possibility that Macy's would elect to postpone commencement of construction of its proposed 75,000-gsf enlargement to be complete by 2019, rather than by 2017. With projected increases in renewable electricity production and other efforts to reduce emissions from electricity supplied through the grid, the GHG emissions from energy use in buildings will decrease. The use of the latest electricity emission factor available from PlaNYC in the analysis for this project leads to a conservative estimate for project completion in both 2017 and 2019. As emissions from electricity use are expected to decrease over time, the potential postponement to 2019 would not adversely affect GHG emissions.

## OPERATIONAL MOBILE SOURCE EMISSIONS

The number of annual motorized vehicle trips and miles traveled by mode (cars and trucks) that would be generated by the proposed project was calculated using the transportation planning assumptions developed for the analysis presented in Chapter 10, "Transportation." The assumptions used in the calculation of annual trips and vehicle miles traveled (VMT) include average daily weekday person trips and delivery trips, the percentage of vehicle trips by mode, and the average vehicle occupancy. Travel distances shown in Table 18-6 of the *CEQR Technical Manual* for "Other NYC", i.e. boroughs other than Manhattan, were used to calculate annual vehicle miles traveled by personal vehicles. The average one-way truck trip was assumed to be 38 miles, as per the *CEQR Technical Manual*. Table 18-8 of the *CEQR Technical Manual* was used to determine the percentage of vehicle miles traveled by road type.

It is important to note that the vehicle trip projections presented in Chapter 10 are based on conservative assumptions, leading to GHG emission projections that are likely much higher than

[5] PlaNYC, Inventory of New York City Greenhouse Gas Emissions, Appendix I, November 2014, based on 2013 data (most recent available at time of analysis).

what would realistically be emitted from the project. Specifically, as discussed in Chapter 10, the number of project-generated trips was assumed to be directly proportional to the increase in square footage of retail space, i.e. that the approximately 20 percent increase in retail floor area would result in a 20 percent increase in vehicle trips. However, the information presented in the Institute of Transportation Engineers (ITE) Trip Generation Manual[6] shows that trip generation rates per square foot decrease with increasing size of shopping establishments. These rates drop as the size of the shopping centers reaches approximately 100,000 square feet, dropping more gradually as the floor area increases to 500,000 square feet, and leveling off as floor area increases further. The ITE data provide a strong indication of increased trip linkage within larger retail establishments. The ITE data also indicate that a new retail center with floor area of 313,583 square feet would generate approximately 2.8 times more trips than the equivalent (313,583 square foot) proposed enlargement of retail uses at the existing Staten Island mall.

The guidance for calculating GHG emissions presented in the *CEQR Technical Manual* calls only for the consideration of overall project generated emissions, and does not "take credit" for emissions that would otherwise be generated (without the project). However, in the case of the proposed project the environmental benefits of co-locating new retail uses with existing ones are not readily apparent unless the trips that the potential customers of the proposed project would otherwise take (without the proposed project) are considered.

Furthermore, the VMT projected for this analysis are not all "extra" vehicle miles, which also undermines the environmental benefits of sustainably co-locating more goods and services used by the local residents. For example, a resident that currently drives to the mall, presumably also drives to the grocery store at a different, and possibly more distant location. With the co-location of the retail and grocery uses, the total miles traveled by that and other residents would potentially decrease, resulting in lower GHG emissions. Nonetheless, this GHG assessment is based on the conservatively estimated trips discussed in Chapter 10, and the guidance provided in the *CEQR Technical Manual*, resulting in a conservatively high estimate of GHG emissions for this disclosure.

Using the high trip and VMT estimates discussed above, the mobile GHG emissions calculator was used to project car and truck GHG emissions attributable to the proposed project. In the event that the completion of Macy's enlargement is postponed to 2019, the proposed project's mobile source emissions would be slightly lower, as vehicle emissions continue to drop, with continuing increases in vehicle efficiency over time. Therefore, the completion of the proposed project by 2019 would not have an adverse effect on GHG mobile source emissions.

EPA estimates that the well-to-pump GHG emissions of gasoline and diesel are approximately 22 percent of the tailpipe emissions.[7] Upstream emissions (emissions associated with production, processing, and transportation) of all fuels can therefore be substantial and are important to consider when comparing the emissions associated with the consumption of different fuels. The proposed project would use natural gas as fuel and a comparison of emissions with the use of other fuels is not considered. Consistent with the *CEQR Technical Manual* guidance the well-to-pump emissions are not considered in the analysis for the proposed

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[6] Institute of Transportation Engineers (ITE) Trip Generation Manual, 8th Edition, Volume 3, 2008. Information based on Use Group 820 and equation provided for weekday daily vehicle trips.

[7] Environmental Protection Agency, *MOVES2004 Energy and Emission Inputs*, Draft Report, USEPA420-P-05-003, March 2005.

project. The projected annual VMT, forming the basis for the GHG emissions calculations from mobile sources, are presented in **Table 12-3**.

**Table 12-3**
**Projected Annual Vehicle Miles Traveled for the Proposed Project**

| Proposed Use | Personal Vehicles (million miles per year) | Trucks (million miles per year) | Total (million miles per year) |
|---|---|---|---|
| Retail | 15.3 | 7.0 | 22 |
| Cinema | 5.4 | 3.5 | 9 |
| Supermarket | 6.3 | 0.6 | 7 |
| **Total** | **27** | **11** | **38** |

### CONSTRUCTION GHG EMISSIONS

Emissions associated with construction have not been estimated explicitly. GHG emissions from building construction (both direct and emissions embedded in the production of materials, including on-site construction equipment, delivery trucks, and upstream emissions from the production of steel, rebar, aluminum, and cement used for construction) are typically in the range of the total emissions from the operation of the project over approximately 5 to 10 years.

### EMISSIONS FROM SOLID WASTE MANAGEMENT

The proposed project would not change the City's solid waste management system. Therefore, as per the *CEQR Technical Manual*, the GHG emissions from solid waste generation, transportation, treatment, and disposal are not quantified.

## D. FUTURE GHG EMISSIONS WITH THE PROPOSED PROJECT

### BUILDING OPERATIONAL EMISSIONS

The projected GHG emissions from energy use for the operation of the proposed project are presented in detail in **Table 12-5**. The energy savings that would be achieved through the various sustainability measures that would be implemented (discussed below) are not accounted for in the GHG emissions calculated. Therefore, the emissions associated with the proposed buildings shown in **Table 12-5**, are conservatively high.

**Table 12-4**
**Projected Annual Building Operational Emissions**
**(metric tons $CO_2e$)**

| Proposed Use | Electricity | Natural Gas | Total |
|---|---|---|---|
| Retail | 1,159 | 488 | 1,647 |
| Restaurant | 245 | 39 | 284 |
| Food Court | 135 | 116 | 251 |
| Cinema | 275 | 121 | 396 |
| Common Area | 175 | 52 | 227 |
| Supermarket | 360 | 79 | 439 |
| **Total** | **2,349** | **895** | **3,244** |

**Source:** $CO_2e$ estimates were developed by AKRF based on projected energy consumption data provided by Dagher Engineering.

### MOBILE SOURCE EMISSIONS

The detailed mobile-source GHG emissions by proposed use are presented in **Table 12-5**.

**Table 12-5**
**Projected Annual Mobile Source Emissions**
**(metric tons $CO_2e$)**

| Proposed Use | Personal Vehicles | Trucks | Total |
|---|---|---|---|
| Retail | 6,836 | 11,348 | 18,184 |
| Cinema | 2,387 | 5,706 | 8,093 |
| Supermarket | 2,795 | 1,036 | 3,831 |
| **Total** | **12,019** | **18,089** | **30,108** |

### SUMMARY

A summary of annual operational GHG emissions from the proposed project uses by emission source is presented in **Table 12-6**.

**Table 12-6**
**Projected Annual Operational Emissions**
**(metric tons $CO_2e$ per year)**

| Proposed Use | Building Operational | Mobile Source[1] | Total Operational |
|---|---|---|---|
| Retail | 1,647 | 18,184 | 19,831 |
| Restaurant[2] | 284 | - | 284 |
| Food Court[2] | 251 | - | 251 |
| Cinema | 396 | 8,093 | 8,489 |
| Common Area[2] | 227 | - | 228 |
| Supermarket | 439 | 3,831 | 4,270 |
| **Total** | **3,244** | **30,108** | **33,352** |

**Notes:** 1. Mobile source emissions include emissions from personal vehicle trips and deliveries by truck.
2. Consistent with Chapter 10, "Transportation", the mobile source emissions from retail uses are based on a floor area of 313,583 gsf, which includes 80,061 gsf of non-department store retail, 41,208 gsf of department store retail, 33,665 gsf of restaurant uses, a 10,831 gsf food court use, the 75,000 gsf Macy's enlargement, 7,946 gsf from conversion of existing loading docks to retail, and 73,377 gsf of common/service/receiving areas. Therefore, any Restaurant, Food Court, and Common Area mobile source emissions are included in the mobile source emissions calculated for retail uses. areas.

The proposed project would result in annual GHG emissions of approximately 33,351 metric tons of $CO_2e$ from operation of the buildings. Of that amount, approximately 30,108 metric tons of $CO_2e$ would be emitted as a result of fuel consumption for vehicle trips generated by the proposed project. A total of approximately 3,243 metric tons of $CO_2e$ would be emitted as a result of grid electricity use and on-site fuel use for energy systems. These operational emissions are conservatively high, as they do not account for all of the energy efficiency and emissions savings that would result from the implementation of sustainable measures described in the following section.

## E. CONSISTENCY WITH THE GHG REDUCTION GOAL

The assessment of consistency with the reduction goal, as defined in the *CEQR Technical Manual*, requires examination of how a project would reduce its carbon intensity, weighed against the considerations listed for five goals: building efficient buildings, using clean power,

creating transit-oriented development and sustainable transportation, reducing construction activity emissions, and using building materials with low carbon intensity.

It should also be noted that the proposed enlargement would be developed on an existing parking lot, thereby reducing the demand for development on undeveloped land. The development on the project site therefore avoids GHG emissions associated with land use change and construction of additional infrastructure. As discussed under "Operational Mobile Source Emissions," there are also environmental benefits of co-locating different retail uses and reducing transportation emissions that might otherwise occur by enlarging an existing shopping center. The proposed project would include a number of sustainable design features that would lower GHG emissions associated with the proposed project. These features are discussed in this section, assessing the consistency of the proposed project with the GHG reduction goal as outlined in the *CEQR Technical Manual*.

**BUILD EFFICIENT BUILDINGS**

It is anticipated that the building would be designed to achieve energy efficiency comparable with the requirements of LEED Core and Shell, resulting in at least ten percent lower energy expenditure relative to a similar building designed to meet but not exceed code (ASHRAE 90.1). As part of that effort, it is anticipated that the project would incorporate the following measures:

- Incorporate window glazing which would optimize heat loss and solar heat gain;
- Use high-albedo roofing materials;
- Incorporate motion sensor lighting control for back-of-house areas;
- Use efficient, directed ("dark sky" compliant) exterior lighting;
- Use efficient lighting (exceeding requirements);
- Provide sub-metering for use of electricity, gas, and water;
- Provide sustainable construction and design guidelines for build-out by tenants; and
- Provide for storage and collection of recyclables (including paper, corrugated cardboard, glass, plastic and metals) in building design.

In addition, the building envelope would likely be designed to exceed building code energy requirements.

The following measures are also being considered and may be incorporated, depending on design considerations and energy modeling to be undertaken:

- Insulation exceeding building code requirements;
- High-efficiency HVAC systems (exceeding requirements);
- Maximization of interior daylighting;
- Building commissioning to ensure energy performance;
- Use of rapidly renewable building materials; and
- Use of low impact development for stormwater design (exceeding requirements).

The following measures would also be encouraged for tenant build-out where practicable and where the measures would not increase cost. These measures would also be reinforced by a future GGP Tenant Guideline Manual update:

- Use of building materials with recycled content;
- Use of building materials that are extracted and/or manufactured within the region;

- Use of wood that is locally produced and/or certified in accordance with the Sustainable Forestry Initiative or the Forestry Stewardship Council's Principles and Criteria; and
- Water efficient and low-maintenance landscaping has been incorporated into the project design, featuring native vegetation and vegetation requiring less maintenance. Reduced water use would indirectly reduce GHG emissions, through a reduction in energy needed to provide water. Lower maintenance requirements would result in less energy use, and lower GHG emissions.

**USE CLEAN POWER**

Natural gas, a less carbon-intense fuel, would be used exclusively for project heat and hot water. The project is also considering the incorporation of solar power systems, which would further reduce GHG emissions associated with electricity use and further the City's GHG reduction goal.

**ENHANCE AND USE TRANSIT-ORIENTED DEVELOPMENT AND SUSTAINABLE TRANSPORTATION**

The site is supported by existing public bus service. The project would connect to existing sidewalks and would provide internal walkways on site. The project is also applying for a 47.5 percent parking reduction per zoning code. On-site parking for alternative vehicles and on-site electric vehicle charging stations are also under consideration.

**REDUCE CONSTRUCTION OPERATION EMISSIONS**

It is anticipated that project construction would include an extensive diesel emissions reduction program, including diesel particle filters for large construction engines and other measures. These measures would reduce particulate matter emissions; while particulate matter is not included in the list of standard GHGs ("Kyoto gases"), recent studies have shown that reducing emissions of black carbon—a constituent of particulate matter—could contribute substantially to reducing global warming in the near term.

**USE BUILDING MATERIALS WITH LOW CARBON INTENSITY**

It is anticipated that the proposed project would be constructed using recycled steel. It is also anticipated that the project would set a target of at least 50 percent (and possibly more) for diverting construction waste from landfill for reuse or recycling. The use of cement replacements such as slag, fly-ash, silica fume, calcined clay, interground limestone exceeding standard practice, subject to water requirements and technical specifications, and will consider the use of cement meeting ASTM C1157 or cement produced using natural gas or renewable energy is also under consideration.

**PLANT TREES**

As part of the proposed project, a great number of trees would be planted, resulting in a net increase of more than 400 trees. Projects proposed in New York City typically lack space for planning a significant number of new trees and the *CEQR Technical Manual* does not list tree planting as a category requiring consideration when evaluating consistency with the City's GHG goal. Nevertheless, the City has a goal as part of PlaNYC to plant a million trees, as well as to "green" parking lots through additional tree planting. The City has recognized the environmental benefits of planting trees, including sequestration of $CO_2$ and has programs in place to encourage planting. Trees remove $CO_2$ from the atmosphere through photosynthesis and store carbon as cellulose in their trunks, branches, leaves and roots while releasing oxygen back into the air. By

providing shade, evaporative cooling, and blocking wind, trees also reduce air conditioning and heating needs, thereby reducing GHG emissions from power plants and heating systems. Another benefit of tree planting is enhanced resilience to climate change through stormwater capture and retention. The information required to quantify the anticipated benefits of planting the trees, such as the number by tree species, and age at the time of planting, is not yet available. However, it is important to consider the long term benefits of $CO_2$ sequestration that would result from the trees that would be planted on site, when evaluating the consistency of the project with the City's goals. ✷